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The American Submerged Pump.

This pump has within the past couple of years come into so general use that almost every one is familiar with it in its ordinary form as a hand pump. We herewith present to our readers an engraving (Fig. 1.) of a very simple power attachment, which has been applied to it with very satisfactory results.

As will be seen from an inspection of our engraving, the power attachment is quite simple, and its action will, we think, be apparent when we say that the larger cog-wheel is suspended in the movable iron frame, which is clearly shown, and an eccentric pin on the face of this wheel is attached to the pump rod, which at the same time serves as a pipe for conducting the ascending water. The motion of the frame gives the same effect as a long connecting rod, but, of course, in a different way.

The action of the valves of the pump will be seen by referring to Fig. 2, in which A represents the body or cylinder of the pump, which is supplied with water during the upward stroke of the piston E, by the puppet valve C. the water, already in the pump, escaping meantime down through the piston head, as represented by the arrow, into the stem of the piston D, which is hollow, and to which the pipe is attached which moves the piston and acts as conductor at the same time. The piston valves I and I are firmly held on their seats by the pressure of water, forming a vacuum below the piston which fills the cylinder A with water through the puppet valve C. When the return stroke is made, the piston valves shift to their upper seats, while the puppet valve C closes, forcing the water in the lower part of the cylinder up into the piston stem D, under the valve I and I, while the puppet valve in the side chamber B supplies the vacuum formed by the down stroke of the piston, which becomes effectually a solid head by the action of the piston valves I and I.

Fig. 1.

In the operation of this pump the chief portion of friction due to packing (which it is usually estimated requires at least 33 per cent. of the power applied) is saved, the piston being so fitted to the chamber as to act to a considerable extent as an Air Pump; hence, when submerged in water, it has a water packing and water lubrication. The channels for the water leading to the centre line of the piston cause an equal bearing on all parts thereof, and a great saving of power, as may be readily shown by closing up one of the piston valves, I and I, and taking water from one side only, as is done in some other pumps. The continuous action of a rotary pump is here simply and economically obtained by a plunger, maintaining nearly a continuous stream without the use of an air chamber, although as they are sometimes used they will be supplied by the company if desired.

The usual arrangement, when the pump is worked by hand is shown in Fig. 3, the missing parts of which will be readily supplied by our readers.

The most recent application of this pump has been made by Mr. PAUL HILLE, an agent of the company, who owns the right for the eastern counties of New Jersey. He has just completed and put to satisfactory tests a small hand fire-engine, made by ingeniously connecting two No. 5 pumps (5-inch cylinder—6-inch stroke) both at draft and delivery, and surmounting them with a large air chamber. This novel fire apparatus rests upon a light iron frame work, on four wheels, and occupies about the same space as an ordinary hose-carriage. Two men can drag it with ease, and six men at the brakes can throw a ¾ inch horizontal stream 125 feet. For the use of small villages nothing could be better, as the cost of building is trifling as compared with other styles of hand engines, and it requires so small force to handle and work it. This pump has received so high commendations from many who have tried it, that we have no hesitation in recommending it as one of the very best in the market.

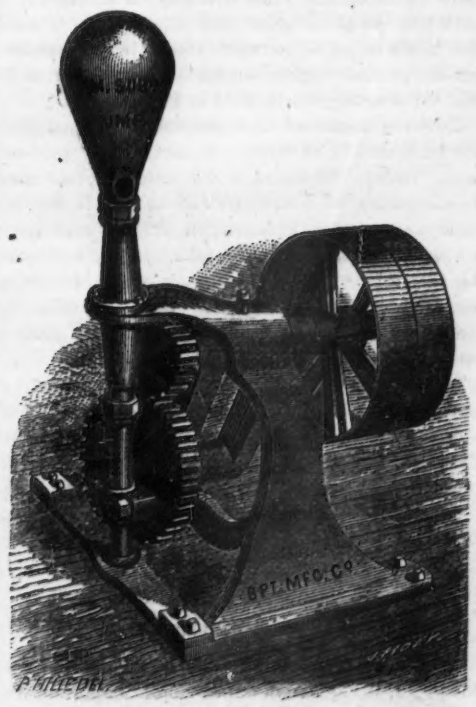

Fig 2.

American Institute of Mining Engineers.

REPORT OF THE THIRD QUARTERLY MEETING.

(Continued from page 334.)

On Thursday morning, Nov. 28, a goodly number (about twenty) of the members and associates gathered at the railway depot in Troy, and were accommodated by the Rensselaer & Saratoga Railroad Co. with a special car on the train to Whitehall. On arriving at the latter point, the party went on board the new and magnificent steamer, "Vermont," (Capt. FLAGG) and was conveyed most comfortably and delightfully up the Lake to Port Henry. The beauty of the scenery and the interesting geological exposures of the rocks along the banks lent additional charm to this voyage, while a good dinner satisfied the inner man in one department, and a lively session of the Institute in the cabin afforded solid intellectual food. The dinner it is not our province to describe, but the meeting deserves as full a report as any of the sessions of the Institute.

In calling the meeting to order, Vice-President RAYMOND announced that the proceedings would be confined to subjects connected with the Champlain Iron Regions, a portion of which the members were about to visit, and introduced to the Institute Mr. JOHN ROGERS, of J. & J. ROGERS, one of the oldest firms engaged in the manufacture of iron in this region. Mr. ROGERS made a few remarks, welcoming the Institute to this part of the country, and alluding to the fact that he had been in the business since 1832, but the Pennsylvania Iron Co., and some others, were already in it when he began.

Prof. G. W. MAYNARD then made an interesting communication on the ores of the Champlain region (see abstract elsewhere), after which Prof. EGLESTON inquired what was the result of certain experiments in treating titaniferous ores. Prof. MAYNARD replied,

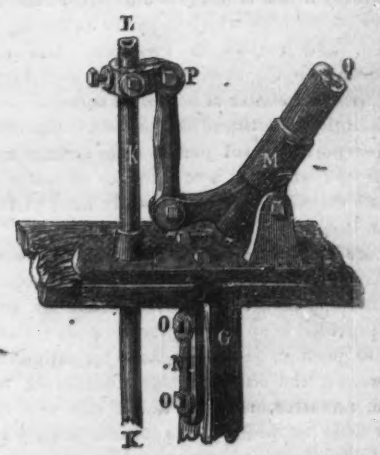

Fig. 3.

that the efforts made near Westport to "sponge" the ores were not successful; but from the Norway mine, the ore, being pure, made a good sponge. At an Essex Co. forge, 25 per cent. titanic ore, 60 of the Norway sponge, and 10 of spiegeleisen was used, and the blooms were sent to Boston, worked in the Siemens furnace, and made into good crucible steel. He had never found a trace of phosphoric acid in th

titaniferous ores. In and about Moriah no titanic acid is found; but from Westport on, these ores occur; and Dr. STERRY HUNT and himself had concluded that they occur in the Labradorite rocks only. Prof. EGLESTON alluded to experiments at the Columbia School of Mines, showing that these ores are a mixture of ilmenite in magnetite, from which the latter can be separated by the magnet.

Prof. W. P. BLAKE made some interesting observations on the Mineralogy of the Sanford beds near Port Henry, as studied by him twenty years ago. The ore contains apatite, known locally as "red sand," and not recognized till EMMONS pointed it out. In 1851 or 1852 an attempt was made without success to use it in manufacturing artificial phosphates. The apatite used to occur in streaks and layers of the bed, in roughly hexagonal crystals, from needles to prisms ¼ in. in diameter. The margin of the bed, on its contact with the country rock, carried the rare mineral allanite, containing cerium and lanthanum, in crystals from ¼ by ⅛ in. to 1 in. by 8 or 10 in. in size. Lanthanite (carbonate of lanthanum) also occurred, from the decomposition of allanite. The ore is free from sulphur, as are most of the phosphatic ores of the region, and tolerably free from silica. The beds partake of the plication of the rocks. The phosphate of lime occurring through them indicates, in Dr. HUNT's opinion, an organic origin for the deposits.

After Prof. BLAKE's remarks, the session was adjourned for dinner, somebody remarking that the members looked, like the ores of the Sanford bed, "red with apatite."

Shortly after dinner, the steamer arrived at Port Henry, and the party were conveyed in carriages to the railroad, where a special car and engine were in waiting to convey them to the mines, situated in the mountains, seven miles from the lake. The railroad has in places a grade of 211 feet to the mile, and is a daring piece of engineering. No new contrivances are in use for surmounting the heavy grades; the engines of the company draw trains of twenty empty cars up the steep hill with ease; and of course there is no difficulty in coming down. The Champlain and Moriah Co. is owned jointly by the Port Henry Iron Co. and WITHERBEE, SHERMAN & Co.

The mines of these firms are among the most productive, and are certainly the most imposing in appearance upon this continent. Ordinary mines disappoint the most romantic expectations of visitors who have dreamed of vast subterranean spaces; since usually one finds but narrow galleries and crooked stopes, in which all excavations made are filled up again as far as practicable, to secure safety. But here the great size of the deposits, and the extraordinary firmness of the country rock, has led to a system of working which is partly quarrying, partly mining, and results in immense, dim caverns, twinkling with the starry lights of the miners, and noisy with the clatter of hammers and the occasional reverberations of thunderous blasts. But the limits of this report will not permit us to enlarge upon descriptions; we hope, some day, to do better justice to these magnificent mines, both in their picturesque and in their commercial aspects.

Before the mines had been thoroughly viewed, it was dark; and a portion of the company repaired to the Sherman House at Moriah, where Mr. SHERMAN had provided hospitable entertainment for all. But another portion, too enthusiastic for fatigue or hunger, went to the charcoal blast furnace of WITHERBEE & SHERMAN, situated about one and one-half miles from the mines. The furnace is sixty two feet in height. It was constructed about six years ago at a cost of $160,000, and its enterprising owners and manager have successfully demonstrated the practicability of a charcoal furnace of such extraordinary height, forty feet being the usual limit. It has closed top and six tuyeres, with a pressure of blast equal to one pound at a temperature of seven hundred and fifty degrees. Production per day about twelve tons of foundry iron, used chiefly for car wheels. Of charcoal, one hundred and twenty-five bushels to the ton of iron produced, are required. With the use of pure ore and charcoal as fuel, the cinder product is small, and is added to the charge. Blast is supplied by a horizontal engine of twenty-inch cylinder, five feet stroke, from an air cylinder sixty-three inches in diameter; average number of revolutions about twenty-five. A steam lift is employed, and the charging is done with a cone.

The reunion of the members at the Sherman House was speedily followed by a jovial supper, at which Mr. SHERMAN presided. In the evening a session of the Institute was held in the parlors of the hotel, at which an elaborate and interesting paper was read by Mr. J. W. HARDEN, of Philadelphia, on The Ores of the South Mountain and Cumberland Valley.

The following papers were presented, and read by title, and ordered to be included in the proceedings, the lateness of the hour precluding their reading at length: On Blast Furnace Slags, by KENNETH ROBERTSON, E. M., of Boonton, N. J.; on the Importance and Advantages of the Institute, by MARTIN CORYELL, of Wilkesbarre, Penn.; and a Report and Suggestions to the Officers and Members, by MARTIN CORYELL, Secretary. These papers will be printed in full in our columns.

Several other papers were withdrawn by these authors, among them one on the Coal Trade of Pennsylvania, by JAMES MCFARLANE, of Towanda, which we trust will be presented at the next meeting of the Institute.

After passing resolutions of thanks to the Champlain and Moriah Railroad Co., the Messrs. WITHERBEE & SHERMAN, and various officials whose courtesy had added so much to the pleasure and profit of the excursion, the Institute adjourned, to meet again on the third Tuesday in February, at such place as the Council shall select. The Council has taken as yet no decisive action in the matter; but the general impression and desire appear to be that the meeting will be held in Philadelphia.

How the members and associates reached their several homes is, of course, no part of the "proceedings," though we could, if we would, reveal some jolly incidents of the wintry ride to Port Henry, the excursion to Crown Point which did *not* take place, the midnight trip upon the lake, and the somewhat haggard and "played-out" group which, nevertheless, unconquerably merry to the last, took the southward train from Whitehall in the gray dawn of Saturday.

In looking back upon a most successful meeting, we feel bound to acknowledge again, that great credit is due to the activity and enthusiasm of Prof. G. W. MAYNARD, who constituted, all by himself, the efficient "local committee," and couldn't have done better in that capacity, if there had been a dozen of him.

The Economy of the Blast Furnace.*

BY PROF. FRED. PRIME, JR.

To an association like the one before which I read this paper, few questions can be more important and constantly recurring than the following, viz.: "What economy can be effected in the manufacture of American iron?" And it is the one with which I purpose to deal in this paper; premising, however, that my object is merely to indicate the direction in which an answer should be sought for, rather than to give it myself. This subject may be divided into two parts, "Economy in the production of pig iron" and "Economy in the manufacture of wrought iron," but it is to the former alone that I shall confine myself this evening.

Of late years the improvements inaugurated in the Cleveland district have excited the wonder and admiration of the iron world. Instead of 30, 40 and 50 feet furnaces, the iron-masters of this district have taught us to build them of 70 and 80 feet, which last height is, I believe, the greatest yet reached in the United States.

The first object of the furnace manager is, *cæteris paribus*, to obtain the greatest amount of metal with the least consumption of fuel. So long as gases are escaping from the furnace throat of such a nature and temperature as to be capable of reducing the ore being treated, we know that heat, or in other words, fuel is lost. The first point to be settled is, at what temperature each ore commences to be reduced.

BELL has shown that in the Cleveland ore this process begins at 424 deg. Fahrenheit, while he holds that in general $Fe_2 O_3$ is deoxidised at all temperatures between 302 deg. F. and a bright red heat, but that it is never absolutely complete. And he shows that the reduction of ores containing $Fe_2 O_3$ is dependent not on their chemical composition, but on their molecular condition, and the rapidity of the current of gases passing over them; and the deoxidation and carbon deposition are at a maximum at about the temperature of melting zinc, 783 deg. F. Now, to ascertain at what temperature the various magnetites, hematites and limonites of this country commence to be reduced it would be necessary to make a series of experiments on the subject with native ores, in the performance of which no very great expense would be incurred. This having been done, the next step should be to ascertain the temperatures and compositions of the escaping gases, in order to see whether all the work that was practicable had been performed by them in the way of deoxidizing the ores. This, of course, would vary very much with the different coals and varieties of each. Should it be found, for example, that the gases when escaping at the furnace throat are still capable of deoxidizing the ore, then the inference would justly be that the furnace was not high enough and that fuel was being lost, and it would be a commercial question, as LOWTHIAN BELL states it, whether the additional expense of enlarging the furnace would be sufficiently paid for by an improvement of the operation or an adequate increase of work. Where anthracite is used in the blast furnace, there need be comparatively but little apprehension as to the burden crushing the coal, except by the decrepitation of the latter, and I would call the attention of those persons present who direct such furnaces to the question whether they have ever instituted comparisons in regard to the economy of anthracite furnaces when both the pressure and amount of blast are increased? Anthracite, although equal to coke as a fuel in the amount of carbon, requires a much greater amount of blast for its perfect combustion, which should be equally distributed through a large number of tuyeres, and I would suggest that ironmasters should endeavor to ascertain the fact, whether with such a dense fuel, considerable economy might not be attained by increasing the height rather than the diameter of such furnaces. We have in this country many open burning coals, which either do not coke at all, or else afford a very tender coke in ordinary ovens. In Great Britain the Ferrie self-coking blast furnace has been introduced for the purpose of coking the fuel in the furnaces and at the same time relieving the coke of a portion of its burden. In order to do this a furnace eighty-three feet high is divided, for a distance of twenty feet below the space required for the cup and cone, into four compartments, by vertical walls supported on arches and radiating from the center. Both these and the circumferential walls are pierced with flues, so that a portion of the gases taken from the top can be led down to the level of the bottom of the compartments and—receiving a supply of air through gratings in the external wall of the furnace—be ignited and consumed in the flues traversing the partition walls and surrounding the compartments, the draft through these flues being assisted by chimney stacks at the top of the furnace. Time does not permit me to give any further details [for which I must refer you to "Engineering" of June 16th, 1871,

* A paper read before the American Institute of Mining Engineers.

and volume I. of "Journal of Iron and Steel Institute."] Suffice it to say, that in Lanarkshire district, the extraordinary result was obtained of saving a ton of coal to the ton of iron made, and also about 2½ cwt. of ore. LOWTHIAN BELL, who at first attributed the entire saving to the increased height of the furnace, subsequently changed his opinion and acknowledged that a portion of it was due to the combustion of the gases in the chambers.

Another point to which I wish to direct your attention is the manner of taking off the blast furnace gases from the top of the furnace. It is a well known fact that the gases have a tendency to escape up the sides of the furnace, leaving, in the centre, a column of ore, fuel and brimstone untouched. The common method practiced in this country, where the furnaces are close-topped, of taking off the waste gases at the throat from the sides of the furnaces, tends to increase this difficulty by creating a draught in the direction of the sides. Consequently if the gases are taken off from the centre of the furnace above the charging hole, this tendency is more or less counteracted. There can, however, be no doubt that taking off the waste gases from the centre of furnaces tends to prevent the latter from scaffolding, and also to economize fuel. LURMAN'S patent cinder tap is probably so well known to you that all mention of it here would be superfluous, although experiments at various iron works have been made with very contradictory results.

Another point, which I cannot too urgently set before you, is the very insufficient attention paid in this country to the proper comminution of ores. When small and large pieces of ores are thrown indiscriminately into the top of a furnace, it must necessarily work very irregularly, owing to the fact that the smaller portions are reduced and carbonized before the interior of the larger ones has more than begun to be reduced. The consequence of this is a very irregular yield in the different qualities of iron. This would to a great extent be ameliorated if not entirely prevented by bringing the ore to a nearly equal state of division by passing it through some ore-crusher or breaking it with hammers. As regards the calcining of ores, but very little has been done in the United States. It is true that in some places black-band is calcined in open heaps, in order to concentrate the percentage of iron, while in others, as at Johnstown, coal slack is intermingled with the impure carbonate of iron on a hill-side and the mass of ore roasted. But the important advantage of rendering the magnetites and red hematites of this country more porous, and consequently more easily reduced in the blast furnace by calcining them in kilns, has, I believe, only been tried at Ringwood, N. J., with what result I do not know; but it is claimed for the Westman furnace, which is the kind built there, and is heated by a portion of the blast furnace gases, that it renders ores porous, however dense they may be. [Mr. PECHIN, of Dunbar, Pa., stated in the subsequent discussion, that he had a kiln on the Cleveland plan 40 feet high.] Of course where the ores contain water a great advantage is gained in thus removing it before it passes into the blast furnace, where heat is rendered latent by its conversion into steam, and either more fuel is necessary, or the temperature of the upper portion of the furnace considerably decreased, while in many furnaces it would be possible to utilize a portion of the gases now lost, in roasting the ores. Of course it is a purely commercial question whether the roasting of the ores would pay, but I am convinced that in many localities it could be profitably done, especially by using coal-slack for this purpose. Experiments in this direction will undoubtedly be made before long, and if coal-slack cannot be directly used, as in the case of anthracite, some other method will be devised for converting it into carbonic oxyd outside of the calcining kiln, and if necessary adding a certain preparation of lump coal to the ore in the interior of the kiln. By running the calcined ore, while still hot, to the top of the furnace and passing it into the furnace, the decrease in temperature which always takes place when a fresh charge of cold ore and flux is added, would in a great measure be obviated.

Another point to which I wish to allude is the proper construction of hot blast stoves. Mr. BELL believed that a very high degree of heating the blast is not requisite, and that when a temperature of 900 to 1,000 degrees Fahrenheit has been obtained, the maximum has been reached. But Durham coke and Cleveland ore are different from anthracite coal and magnetite or hematite, and it seems to me that we have no right to assume *a priori* that the conditions which are found to be the best in the Cleveland district will also be the most suitable for the fuels and ores of the United States. I believe that by increasing the temperature of the blast considerably above that actually attained in this country, we shall effect a very palpable saving in the amount of fuel now necessary to produce a ton of pig metal, the temperature to which the blast may be heated being necessarily limited by the power of resistance offered by the iron pipes. The very common practice here, of permitting the hot gases to rise up vertically between the limbs of the U shaped pipes, is a very imperfect method of heating the blast, the gases escaping so rapidly as to be capable of but very imperfectly communicating their heat to the iron pipes, and consequently to the blast. Leaving out of the quession the application of the regenerative system as too expensive for us to experiment upon, until the English iron masters are able to give us some satisfactory answer, let us look at our present pipes and instead of conducting the hot gases vertically, cause them to pass in a horizontal direction, and we shall find that considerable economy will in all probability be attained; the blast will be heated to a higher degree, and consequently less fuel will be consumed. Should the hot products of combustion be found to still contain useful heat after passing once laterally through the hot blast ovens, they might be made to return in the direction whence they came, through another oven, or be passed under the boilers. A considerable economy in fuel may be effected by simply arranging the blast pipes in such a manner that the circles of fusion created by each shall be merely tangential and not intersecting. This may be ascertained by inserting an iron rod through each blast pipe in succession for a minute, and when that portion of it situated in the circle of fusion is red hot, the alteration then necessary in the position of the tuyeres is easily accomplished on calculating the space occupied by each circle. The last point to which I wish to allude this evening, is the importance of consolidation. Those of you who are acquainted with the British iron trade are probably aware of the enormous capital employed, and the large number of furnaces owned by separate companies—eight being a very common number, and less than four a rarity. This is one of the means by which they can afford to undersell the American iron masters when we have no tariff. Another advantage they possess is in the consolidation of their works, which enables them to dispense with a large number of officials otherwise necessary.

My aim in this paper has been merely to indicate what might be done as regards economy in the manufacture of iron, although some of the ideas appear to be impracticable at present; but before entering upon any experiments, the first and principal question to be asked and satisfactorily answered is: Will the alteration of the furnaces, and other expenses therein involved, *pay* in the end?

Hydraulic Cements.

THEIR ADAPTABILITY FOR USEFUL AND ORNAMENTAL PURPOSES.*

By DR. ADOLPH OTT.

DR. OTT, the speaker, began by noting that there are few branches of industry, which to-day possess more practical interest, than that pertaining to the application of hydraulic cements. They are not only of the greatest importance for all constructions under water, but they are also capable of replacing the natural stone for superstructures in most, not to say in all instances. It may safely be asserted that their use for this latter purpose has made a remarkable impression in our modern architecture, and has replaced the old stiff and clumsy masses, by designs of elegance and boldness of conception. One need but compare the columns, arches and lofty balconies of European Capitals with those of former periods, to see how much more ease and freedom characterize our modern style.

The lecturer then gave a very full and interesting history of hydraulic cements, in which he related for instance, that the Romans knew how to make artificial stone, which they used for their harbor constructions.

The merit of the discovery of artificial cement belongs to JOSEPH ASPDIN, in England (1824). VICAT, an eminent French engineer, made first an extensive use of cements, in applying them for the construction of bridges, locks, viaducts, canals, &c. France saved through him, in the building of bridges until 1845, almost seventy millions francs. The credit, however, of having established the first scientific explanation of the process of solidification, and having indicated the way of composing hydraulic cements, *from materials occurring almost everywhere*, and in the shortest and most certain manner, belongs to the German chemist and academician, JUSTUS FUCHS (1828). Further valuable information on this topic is due to the Frenchmen, BERTHIER, FRÉM, MÉNE, RIVOT, CHATONEY, to the Englishmen PASLEY, WHITE & SONS, and MACLEOD; and to the Germans, PETTENKOFER, WINKLER, FEICHTINGER, MANGER, HELDT, MICHAELIS, and others.

The lecturer then spoke of the qualities of Portland cement, and described the manner of producing artificial stone from it. He then went on to describe a composition stone of his, for which he claims that, all other conditions being alike, it will continue to increase in solidity after a stone, merely composed of a mixture of hydraulic cement and sand (the latter being the common admixture) would have attained its greatest degree of firmness. As regards the materials used, in addition to the ingredients usually employed for the making of artificial stone, they are feldspar, or feldspathic minerals (previously vitrified) quicklime and flint in definite proportions. The chemical reactions taking place by this intermixture may be explained as follows:

Hydrate of lime will, though slowly, replace the potash or soda in the feldspar, and form a compound of the formula of Portland cement, of great binding qualities. This reaction is especially induced by the presence of flint, which, like several others of the chalcedonic varieties of quartz (according to FUCHS), consists partly of soluble silica, which, having a strong affinity for the potash or soda, set free from the feldspar, will form a hydrosilicate of potash or soda. But aside from the formation of silicate of lime and alumina (hydraulic cement), the final result of these reactions is an insoluble compound, probably of the formula of pectolite or acophyllite. Thus nothing remains that might be washed out, and again, through the formation of a cement (similar in composition to Portland cement) *within* the substance of the stone mortar, a slow but steady increase of the firmness of the stone is secured.

After having described his new process for making artificial stone, the lecturer went on to speak more particularly of the application of hydraulic cements. He said that they were especially useful for the manufacture of building stone.

In England, numerous buildings of cement stone have been erected. In London, for instance, the celebrated College of Surgeons, Lincoln-Inn-Fields, &c. In this country, buildings constructed of cement stone, made by the process of GEORGE A. FREAR, have been erected in Brooklyn, Toledo, Buffalo, Chicago, and New Orleans. In Brooklyn, fifty-

*Abstract of a paper read before the Polytechnic Association.

nine buildings are now in process of erection at the present time. The novel feature in the process of Mr. FREAR is a newly discovered solution of shellac, which is used in combination with Portland cement and sand.

Cement stones have also been largely employed for construction in the sea, especially for harbor constructions, breakwaters, and quay-walling. The lecturer referred to the moles of Dover and Alderney in England, to Port Vendres, Cette, La Ciotat, Marseilles and Cherbourg in France; of Algiers and Port Said in Africa, and to those of Cape Henlopen at the mouth of the Delaware. Hydraulic mortar in combination with either gravel, broken stone, or sand, and sometimes with an addition of lime, is furthermore largely used for foundation-walling, sluices, aqueducts, bridges, floors, sidewalks, terraces, roofs, cisterns, reservoirs, sewers, water-pipes, &c. Railroad sleepers are now being replaced by sleepers of cement. For ornamental work, said the speaker, compositions of cement have certainly a great future since the most elaborate forms of art of great durability and strength may be most artistically and economically produced in them. In the Paris Exposition of 1867 there were statues of SOCRATES after TABACCHI, the bust of RAPHAEL after MAGNI, and gothic church windows of immense size. Most in demand are, however, door and window caps, ashlers, stoops, window sills, door sills, chimney tops, bowls, and tables for wash-stands, &c. Artificial rocks, grottoes, inclosures for wells or springs, and cataracts for parks, gardens and hot-houses are now also being produced in cement. Parks which present not a single rock can thus be made to present within a few weeks only the most romantic and picturesque scenes.

In conclusion was read a list of all the German, French, English and American works published on the subject.

Krupp's Works At Essen.*

The celebrated steel works of F. KRUPP, at Essen, in Germany, cover about one square mile, one-fourth of which space is under cover. Mr. KRUPP employs 10,000 workmen, 8,000 in the steel works and the rest in mines and blast furnaces. Nothing but steel is made at Essen. The product in 1866 was 61,500 tons of cast steel. The cementation process is used to make steel for fine tools, but for all other purposes the Bessemer and puddling processes are employed. Ten or twelve ton ingots of cast-steel, usually considered very large, are trifles here. KRUPP has cast 40 tons in one ingot. The great abundance and ingenious arrangement of steam-cranes overcome the difficulty of handling such large masses.

The puddled steel is melted in the crucibles with iron made from peculiar ores, to obtain an adequate supply of which mines and furnaces have been bought in all parts of Germany. The crucibles are made by machinery, and never used more than once. In the tempering house, 100,000 of these are always on hand, in sizes to contain 20, 30, or 40 kilogrammes. Each furnace will receive 4, 8, or 12 crucibles; and the casting house may contain at one time 1,200 crucibles in furnaces. The moulds are all circular, for 60 lb. to 40 ton castings, and all served with steam cranes.

The operation of making a heavy cast is carried on with military precision, generally by signals. The place for the mould is selected and the canals are placed. At the first signal the furnaces are uncovered and the coal is taken out. At another signal, two men at each furnace seize a crucible with tongs, hook it to a bar, by which it is lifted out and set down in front of the furnace; another pair of workmen seize it and carry it horizontally to the troughs. The workmen arrive in such rapid and precise succession that as they pour the molten steel into the troughs it constitutes a continuous stream. The troughs end in a basin of reception. This work requires much nerve and a high degree of discipline in the execution of the manœuvres. Out of 100 picked men promoted to it, 40 give it up as too much for them. Castings are always made in the morning. The ingots are not allowed to cool, but stored in stalls and covered with fine coal. There was, at the time of my visit, $800,000 worth of steel in ingots, more or less worked, thus stored.

The works contain over 50 steam hammers, from 120 lbs. weight up to 50 tons; there are several of 25 and 15 tons. The great 50-ton hammer is the largest in the world; it cost $580,000. The foundations are 100 feet deep in three parts, of masonry, large oak trunks and iron cylinders, bolted together. The anvil and frame rest on these, the rest of the hammer having separate foundations, to save the jar. The anvil is occasionally changed or broken. The frame is of cast iron, 8 inches thick, 6 feet in diameter, 5 meters high and 7 meters wide, forming an arch above and below. An opening 1 meter in diameter leads to a staircase, by which the foundations may be visited and inspected. The engine is supported by columns on the separate, surrounding foundation. The hammer head is 3.7 meters long, 1.59 meters wide and 1.25 meters thick—making 7.5 cubic meters, and weighing a little over 50 tons. The stroke is 3 meters. The lower part is cast-steel, the upper part cast-iron, poured upon the molten steel. The diameter of the steam cylinder is 1.80 meters. Everything is kept in duplicate or triplicate, to prevent detention from breakages. The head once cracked in the upper part; and the anvil frequently breaks. Four cranes, each capable of bearing 200 tons, at the four corners of the hammer, serve it with the red-hot masses. KRUPP intends to build a hammer of 100 tons!

Before each of these cranes is a reheating furnace. These are made with hearths on wheels, so that the heavy ingots can be trundled out, the side being partly torn away for the purpose. A 40 ton ingot, for instance, is moved by chains and long rods, it being impossible to approach it nearer than six feet. All the buildings about the hammer are made extra strong. Whatever else is going on, the hammer is heard over all.

In making tires, a six-ton ingot is cut lengthwise, then across, flattened, punched in the center, hammered round on the nose of the anvil, and turned in an ordinary tire-mill or Ramsbottom machine. They weigh 140 to 400 lbs, and are guaranteed to run 120,000 kilometers, or about 64,000 miles. One of these tires ran 46,000 miles before being turned off the first time. Pump-rods have been turned here 65 feet long, in one piece.

There are several cupolas in the works capable of melting 50 tons at once. A cast iron block weighing 250 tons was made from four cupolas in eight hours.

KRUPP'S Bessemer department is not shown to anybody. The number of converters is variously stated. It may be eight or twelve. They are in a straight line, and served with steam cranes.

Of the remarkable excellence of KRUPP'S cast-steel nothing need be said.

* Abstract of a paper read before the American Institute of Mining Engineers, by Professor THOS. EGLESTON, of Columbia College School of Mines, New York.

Notes on the Champlain Iron Ores.*

BEGINNING on the north, near Plattsburg, we have first the Arnold ore-bed, which is the oldest mine now worked in the region, and contiguous to it, the Palmer Hill mines of J. and J. ROGERS, from which is made, at their works at Ausable Forks and Black Brook, their celebrated blooming iron, used at Pittsburg almost exclusively in the manufacture of crucible steel, on account of its great purity. These ores are strictly not magnetites; they contain from 2 to 8 or 9 per cent. of protoxide of iron, and very little phosphorus, and are probably martite. Some of this ore (from the Indian mine) has been used at the Hudson furnace of GRISWOLD & Co. in the manufacture of pig for the Bessemer process—a high testimony to its purity.

All along the lake are deposits of magnetic ores. At Westport, the Split Rock beds, on the shore of the bay, and the Iron Mountain and Kingdom deposits in the neighborhood, are noted for their titaniferous character. The ores contain from 10 to 13 per cent. of titanic acid. They have not been successfully worked to any considerable extent. In the blast-furnace they are difficult to fuse, and forgemasters do not like them because they give under the hammer so much copper-colored scale.

Just above Port Henry is the celebrated Cheever bed, and back of Port Henry are the most extensive mines of all, the Moriah mines, owned by the Port Henry Iron Co., and WITHERBEE, SHERMAN & Co. These mines are mostly reached by the Lake Champlain and Moriah railroad. The ores in this district are magnetic, hematite ore not having been found. Last year there were drawn over this road 160,000 tons of ore, and since the opening of navigation last Spring nearly 150,000 tons have been thus far transported. The production is about 200,000 tons per year. The ore is of very fine quality, some of it yielding up to 65 per cent. of iron. By special agreement between WITHERBEE, SHERMAN & Co., and the Port Henry Iron Company—the two principal ore firms in Port Henry,—neither firm can exceed the other in its shipments of ore. The ore mined by the former firm is sent as far East as St. John's, N. B., and Westward as far as Cleveland, Ohio, where it is used for mixing with Lake Superior ores. The latter are known as "red short," being ductile when cold but very brittle when hot. This is caused by the presence of sulphur. Owing to small quantities of phosphorus, the ores of the Moriah district are what is called "cold short"—that is, brittle when cold, and ductile when hot. The Moriah mines comprise the old (Sanford) beds on sections 21 and 24, and the New bed, the Fisher and the Barton. There is some trouble in the old bed ore from phosphorus, but not in the New, from which the ore has been used to the extent of 50 per cent. in the Bessemer pig experiments at Hudson.

There are in the employ of the Witherbees two hundred and fifty men, and five pits are worked. The pay-roll shows $10,000 per month are paid in wages. The hours of labor per day are ten, except on Saturday, when nine hours are considered a day's work. Their daily shipments average five hundred tons. There are three varieties of ore sold by them, and also by the Port Henry Iron Ore Company, besides what are termed "new bed," which is also divided into three classes. Of the first three varieties they obtain: for "puddling lump," $5.50; for "screened ore" for furnaces, $5; and for "furnace ore," $4,50 per ton. The "new bed" is thus classified and sold: "New bed separated," $8.50; "new bed pure," $6.50; "new bed furnace,"' $4.50. The Port Henry company work three pits and employ one hundred and ninety-five men.

Farther South, ten miles back of Crown Point, is the very extensive deposit of magnetic ore of the Messrs. HAMMOND. These mines were opened over twenty-five years ago, and the best quality of charcoal iron has been made in their furnace, so good that it has been possible to use it exclusively in the Bessemer converter. Owing to the present low price of anthracite iron, the Messrs. H. have not found it possible to compete any longer with other manufacturers, anh have therefore discontinued their production. At Crown Point, near the Lake, and at many points between Crown Point and Ticonderoga, there are large deposits of magnetic ore, more or less impregnated with sulphur. The presence of this element has, up to this time, prevented the introduction of this ore into market. At Ticonderoga are the extensive mines and works of the American Graphite Company. The principal use to which their graphite is put is for the manufacture of lubricators. This lubricator is being very extensively employed on railways and for all kinds of heavy machinery. The Fort Ann ore is excellent, and there are large mines there.

* Abstract of a paper, presented to the American Institute of Mining Engineers, by Prof G. W. MAYNARD.

THE COAL TRADE.

B. B. WESTERN, COAL EDITOR.

Anthracite Coals.

NEW YORK, Dec. 8, 1871.

WHOLESALE.—Business remains in a very unsettled condition. The demand is light, and what coal is being taken there is great difficulty in procuring vessels to carry. This is a trouble from a new direction. There have been very few vessels for the coasting trade built during the past few years, the old vessels are gradually giving out, leaving the number to carry on the coal business hardly adequate at this season of the year, when so much danger exists in running to and from our Northern coast ports, particularly with coal as a cargo. Many of the vessels seek business at the Southern ports and the West Indies. Old dealers inform us that there never was a time in their recollection when vessels have been so scarce. To-day $3 is quoted for Boston and around the Cape, and other distant places in proportion. This danger of high freights we warned our readers against months ago, and we doubt whether those who put off buying coal until now, waiting for a decline, will not lose considerably by augmented freights, notwithstanding the decline in coal. The circular prices noticed in our last issue are the ruling rates for what business is being done. The general opinion among dealers is that matters will remain in the present state until the December Scranton Auction Sale. If prices recede at this sale, and this seems probable with an increased accumulation between now and then, a reduction in miners' wages for January will be made, which would probably cause a strike. Ten per cent., it is rumored, will be the reduction, which will bring the price per diamond car to 86 cents, the figure upon which the miners went out last year.

There are rumors in the market to-day, of a general suspension in the Schuylkill region. We give no credit to the report, though of the fact that Schuylkill County, in consequence of being at the greatest distance from the greater coal markets, is suffering the most, there can be no doubt. That she will give in first without even a struggle, and thus throw a direct benefit to the remaining working regions, we very much doubt. The complete stoppage of any one of the regions, would curtail shipments to such an extent as to strengthen prices, and carry the market "over the corner." The question is, which region shall it be? Schuylkill County has served her apprenticeship at this kind of business, but at the same time we cannot see how she can help herself, unless a more direct and shorter route to this market can be established.

The following circular of the Pennsylvania Coal Company is the first they have issued for many months:

PENNSYLVANIA COAL COMPANY,
"TRINITY BUILDING," 111 BROADWAY.
NEW YORK, Dec. 1, 1871.

Present prices for Pittston coal, to be delivered at Weehawken pier; subject to the usual conditions of sale and shipment. The Company reserves the right to advance prices at any time; except upon purchases made prior to such advance. Orders sent in, will not bind the Company until accepted.

	Delivered at Weehawken.
Lump per ton of 2,240 lbs.	$4 60
Steamer, " "	4 60
Grate, " "	4 80
Egg, " "	4 90
Stove, " "	5 20
Chestnut, " "	4 60

Fifty cents per ton additional for delivery in Company's boats at other points about the harbor of New York.

The above Prices are for Cash.

GEORGE A. HOYT,
Treasurer.

RETAIL.—The cold weather of the past few days has brought about an active trade, but sales are mostly confined to the large companies. Pittston coal is selling at $5 25 for grate and egg, and $5 75 for stove at the yard.

FREIGHTS.—As mentioned above, vessels are very scarce, and there is much difficulty in effecting charters. New Haven, $1 10; Bridgeport, $1 00; Boston, $2 75.

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Dec. 2, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	21,182 14	719,998 13	20,254 15	1,084,189 15
" Canal	.....	13,962 14	.....	16,502 18
Total	21,182 14	733,960 17	20,254 15	1,100,692 13
Decrease 1871, 346,731 16				

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Dec. 2, 1871, compared with the week ending Dec. 3, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
*Phila & Reading R.R†	70,124	2,984,263	83,024	3,659,436
*Schuylkill Canal	29,427	560,665	15,310	1,010,171
*Lehigh Valley R. R.	28,395	2,810,020	33,904	2,210,272
Lehigh & Sus. R. R.	30,217	965,322	35,376	1,198,271
Lehigh Canal	22,431	781,239	18,306	740,636
Scranton North	9,496	664,284	12,850	816,521
" South	35,590	1,673,601	42,197	1,166,774
Penn. Coal Co., rail	20,255	1,064,090	21,183	719,969
" " " canal	....	16,903	....	13,962
Del. & Hud. Canal Co.	....	1,292,675	14,000	991,825
" " East	14,427	423,413	8,887	317,412
" " West	3,524	82,478	2,796	109,333
South	3,072	413,696	7,954	309,469
Shamokin	10,784	453,375	12,380	597,144
Trevorton	....	67,371	....	87,116
Lykens Valley Coal Co.	....	67,204	....	....
Wyoming South	....	326,645	....	....
Wyoming North	....	....	....	4,167
P. N. Y. C. & R. R. Co.	3,175	276,151	....	104,987
Williamstown Col'y	....	277,319	....	....
Big Lick Col.	....	87,595	....	136,022
Total	280,907	15,291,113	278,367	13,893,517
1870	278,367	13,893,517		
Decrease	2,540	1,397,596		
Increase				

* These figures are for the week and fiscal period ending Nov. 30. See tables below for tonnage since Dec. 1.
† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coa passing over the following routes of Transportation for the week ending Dec. 2, 1871, compared with week ending Dec. 3, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
C. & O. Canal	10,259	518,120	8 629	652,548
B. & O. R. R.	24,654	814,956	22,142	1,143,990
H. & B. T. R. R.	6,068	287,475	6,328	298,990
*Harrisburg & D.	....	680,791	11,615	742,424
*L. V. R. R.	....	13,847	578	355,096
P. & N.Y.C. & R. Co.	4,761	239,660	....	....
Cumberl'd Branch Canal	143	84,026	3,787	193,994
" Railroad	692	110,190	1,454	65,828
Total	46,577	2,749,065	54,633	3,452,870
			46 577	2,749,065
Increase.			8,056	703,805

The tonnage of the P. & N. Y. C. & R. R. Co. is included in that of the L. V. R.R. Co

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad during the four days ending Thursday, Nov. 30, 1871:

	tons. cwt.
From St. Clair	18,743 12
" Port Carbon	4,519 03
" Pottsville	439 01
" Schuylkill Haven	3,158 02
" Auburn	6,179 19
" Port Clinton	9,800 06
" Allentown and Alburtis	183 19
" Harrisburgh and Dauphin	11,614 11
Total paying freight	64,638 13
Coal for Company's use	1,449 17
Total for week	66,088 10
Previously this year	4,423,970 09
Total	4,490,058 19
To same time last year	3,750,989 16

Amount of coal transported on the Philadelphia and Reading Railroad during the two days ending Saturday, Dec. 2, 1871.

From St. Clair,	9,722 06
" Port Carbon,	1,967 01
" Pottsville,	270 02
" Schuylkill Haven,	1,378 16
" Auburn,	2,034 07
" Port Clinton	3,525 12
" Allentown and Alburtis,	3 525 12
" Harrisburg and Dauphin,	3,878 10
Total paying freight,	22,776 14
Coal for Company's use,	810 19
Total for week,	23,587 13

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Year ending November 30, 1871.

	Total for Year.	Last Year.	Increase & Decrease.
Passing over Main Line and Leb. Val Branch	3678413 11	3108869 00	i 569,544 11
For Shipment by Canal	958,323 16	531,070 07	i 427,253 09
Shipped Westward via Northern Central R. R.	323,666 12	196,358 08	i 127,308 04
Shipped West or South from Pine Grove	93,328 10	35,481 18	i 57,846 12
Consumed on Laterals	136,132 11	124,673 08	i 11,459 03
Lehigh and Wyoming Coal	50,325 08	65,045 11	d 14,720 03
Total Anthracite paying frgt	5240190 08	4081498 12	i1,178,691 16
Bituminous	541,091 19	426,872 10	i 114,219 09
Total of all kinds paying frgt	5781282 07	4488371 02	i1,292,911 05
Coal for Company's use	221,290 16	145,133 07	i 76,157 09
Total Tonnage for Year	6002573 03	4633504 09	i1,369,068 14
SHIPPED BY CANAL.			
From Schuylkill Haven	914,272 17	536,128 06	i 378,144 10
" Port Clinton	95,898 00	24,539 00	i 71,359 01
Total Tonnage per Year	1010170 17	560,667 06	i 449,503 11

Huntington and Broad Top R. R. Co.

For week ending Dec. 2, 1871	6,328 tons.	
Same time last year	6,068	"
Increase	260	
Decrease	....	"
Total amount shipped to date	298,990	"
Same time last year	287,475	"
Increase	11,515	"
Decrease		

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for four days ending Nov. 30, 1871, with totals to date, and two days ending December 2, 1871.

WHERE SHIPPED FROM.	4 DAYS Tons. Cwt.	TOTAL Tons. Cwt.	2 DAYS Tons. Cwt.
Total Wyoming	8,722 01	573,581 06	3,034 03
" Hazleton	21,977 13	1,317,821 07	12,647 11
" Upper Lehigh		2,343 01	38 16
" Beaver Meadow	2,741 09	480,435 15	4,557 17
" Mahanoy	5,636 06	498,123 01	2,452 11
" Mauch Chunk		7,8-8 18	15 14
" Sullivan & Erie	784 13	8,881 05	248 04
Total Anthracite	46,862 02	2,889,074 03	22,994 15
Bituminous Coal from all sources	578 10	355,095 18	
Total by rail and canal	47,440 12	3,244,170 01	22 994 15
Same time last year	40,698 03	3,622,433 13	34,168 18
Increase	6,742 09		
Decrease		378,263 12	11,174 03
Forwarded East from Mauch Chunk by rail	33,903 16	2 210,272 05	19,644 16
Same time last year	28,395 02	2,810 020 07	26,292 06
Increase	5,408 14		
Decrease		599,748 02	6,647 10

RECAPITULATION.

Forwarded East from Mauch Chunk by rail	33,803 16	2,210,272 05	19,644 16
Forwarded North from L. & B. Junction	4,593 04	311,420 03	1,676 08
To N. C. R. R., at Mount Carmel			
To L. & S. R. R. at Packerton for rail	26 00	4,765 19 7,188 10	60 14
Delivered at M'h Chunk	11 11	1,348 07	17 03
Delivered on line of road above Mauch Chunk	185 07	12,493 09	155 19
Delivered above Mauch Chunk for use of L. V. R.R.	409 02	50,632 04	537 08
To L. & S. R. R., at Penn Hav., for railroad		94 10	
Do. for canal	5,180 12	209,734 00	767 00
At M. Chunk for canal	2,742 10	81,124 16	99 07
Total Anthracite	46,862 02	2,889 074 03	22,994 15
Bituminous Coal	578 10	355,095 18	
Total all kinds	47,440 12	3,244,170 01	22994 15

This report includes all Bituminous Coal carried over the Lehigh Valley and P. & N. Y. Railroads from December 1st 1870 to date.

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Sus. Div.)

Week ending Dec. 2—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1871., tons ct	WEEK 1870. tons ct.	YEAR 1871 tons cwt.	YEAR 1870. tons. cwt.
Wyoming Region	28326 08	26789 12	1206995 17	1165667 00
Upper Lehigh Region	3051 16	3552 15	97222 12	142566 10
Beaver Meadow Region				
Hazleton Region	6257 10	9107 09	212187 04	314299 08
Mahanoy Region				
Trescakow Region	2711 03		75280 01	
Mauch Chunk Region	8671 17	6266 19	215245 17	117857 17
Totals	49028 14	45716 15	1806911 11	1740390 10
Increase	3301 19		66521 01	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	31375 11	30716 14	1198275 17	965322 02
Forwarded East of Mch Chunk by Canal	8962 01	12206 07	419905 16	524106 07
Delivered at and above Mauch Chunk	1961 18	1069 12	63840 10	42897 15
Delivered to L. & B. R. R. at Plymouth Bridge	2576 14	1788 12	96333 01	184261 12
L. V. R. R at Packer'n	119 10	373 10	28146 07	23802 14
Totals	49018 14	45716 15	1806911 11	1740390 10
Of the above there was transported on acc'tn of L. C. & I. Co	11930 08	8824 15	319956 07	165534 10
W.-B. C. & I. Co	19762 17	17850 04	803206 04	581729 09
Totals	31693 05	26674 19	1123164 11	747263 19
Increase	5018 06		375898 12	
Decrease				

Lehigh Coal and Navigation Company.

Report of Coal transported over the Lehigh Canal and L. & S. Div. of Central Railroad of New Jersey for the week ending Dec. 2, 1871, and for the year 1871.

			WEEK.	YEAR.
Forwarded East of Mauch Chunk by Rail			35,375	1,198,275
Delivered at and above	do.,		1,964	63,840
Forwarded East of	do.,	by Canal	18,305	740,636
			55,646	2,002,752
Corresponding period last year—				
Forwarded East of Mauch Chunk by Rail			30,216	965,322
Delivered at and above	do.,		1,069	42,897
Forwarded East of	do.,	by Canal	22,431	781,292
			53,717	1,789,512
Increase on Railroad			6,054	253,896
Decrease " "				
Increase on Canal				
Decrease " "			4,125	40,656
Of the above there was transported on account of—				
Lehigh Coal Nav. Co			17,550	582,735
Wilkesbarre Coal & Iron Co			19,762	803,206
			37,323	1,385,941
Corresponding period last year—				
Lehigh Coal Nav. Co			14,627	274,937
Wilkesbarre Coal & Iron Co			17,850	581,729
			32 477	856,667
Increase			4,845	529,274

Shamokin Coal Trade.

For week ending December 2, 1871	12,379 14
Same time last year	10,784 09
Increase	1,595 05
Decrease	
Total amount shipped to date	597,143 14
Same time last year	456,375 07
Increase	140,768 07
Decrease	

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for four day ending Thursday, Nov. 30, 1871.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	14,066 14
" Port Clinton	1,243 00
Total for week	15,309 14
Previously this year	994,861 03
Total	1,010,170 17
To same time last year	560,665 06

For the week ending Saturday, December 2, 1871.

From Schuylkill Haven	5,298 10
" Port Clinton	—
Total for week	5,298 10
Previously this year	—
Total	5,298 10
To same time last year	9,251 05

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending Dec. 2, 1871.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	14,000	991,825
By Railroad, East	8,887	317 412
" " West	2,796	109 333
" " South	7,954	309 499
Total Tons	33,637	1,728,089

For the same period last year.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,		1,292,675
By Railroad, East	14,427	413 413
" " West	3,524	82,478
" " South	3,072	413,696
Total Tons	21,023	2,212,262
Decrease	484,043	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Dec. 2, 1871.

	WEEK.	SEASON.
North	51,662 17	1,493,012 19
South	7,954 03	309,469 10
Total 1871	59,617 00	1,805,482 09
Corresponding time in 1870:		
North	28,408 19	1,929,100 17
South	3,072 13	413,696 12
Total	31,481 12	2,342,797 09
Increase North	28,253 18	
Decrease North		433,087 18
Increase South	4,881 10	
Decrease South		104,227 02
Total increase 1871	28,135 08	
Total decrease 1871		537,315 00

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna and Western R. R. for week ending Dec. 2, 1871.

	Week. Tons Cwt.	Year. Tons. Cwt.
Shipped North	12,849 11	516,521 08
Shipped South	42,496 19	1,166,774 08
Total	55,346 10	1,683,295 16
For the corresponding time last year:		
Shipped North	9,486 04	664,283 17
Shipped South	35,690 04	1,673,601 00
Total	45,270 08	2,337,884 17
Increase	10,270 02	
Decrease		654,589 01

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Dec. 2, and during the year 1871, compared with the corresponding period of 1870.

WEEK.

	To C. & O. Canal Tons. Cwt.	To P. & O. R. R. Co. Tons Cwt.	Total. Tons Cwt.
1871	8,628 14	22,142 03	30,770 17
1870	10,258 18	24,653 17	34,912 15
Decrease	1,630 04	2,511 14	4,141 18
Increase			

YEAR.

1871	652,548 03	1,143,990 01	1,796,538 04
1870	518,119 17	814,955 11	1,333,075 08
Increase	134,428 06	329,034 10	463,462 16
Decrease			

Cumberland Branch

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R. R. C. Tons. Cwt	Total. Tons Cwt.
1871	3,786 16	1,454 03	5,240 19
1870	142 12	691 15	834 07
Increase	3,644 04	762 08	4,406 12
Decrease			

YEAR.

1871	193,993 10	65,828 09	259,821 19
1870	84,028 04	110,190 07	194,218 11
Increase	109,567 06		65,605 08
Decrease		44,361 18	

Company Coals.

Dec. 1871.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	—	—	—	—	—	—
*Pittston at Weehawken	4 60	4 60	4 80	4 90	5 20	4 60
*Lackawana at Weehawken	4 60	4 60	4 80	4 90	5 20	4 60
Wilk'b're at Hoboken	4 00	4 00	4 50	4 60	5 50	5 40
Old Co. Lehigh at Pt John'n	5 00	—	5 00	5 00	5 50	4 50
Lehigh at Eliz. Port	5 00	—	5 00	5 00	5 50	4 50

For freights to different points see "Freights."
* To contractors.

Line Prices for Coal Dec, 1871,

	Lump	Broken	Egg	Stove	Ches'
At Mauch Chunk	4.00	4.00	4.00	4.25	3.00
" Wilkesbarre	3 75	3.75	3.75	4.00	3.00

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. Dec. 9. R. A.	W. A.	AT PHILADELPHIA. Dec. 9. R. A.	W. A.
SCHUYLKILL.				
Lump	$—	$—	— —	— —
Steamer	4 50	— —	— —	4 50
Broken	4 50	— —	— —	— —
Egg	— —	— —	5 00	4 75
Stove	5 00	— —	5 00	5 00
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 50	— —	— —	— —
Broken	5 50	— —	— —	— —
Egg	5 50	— —	— —	— —
Stove	6 00	— —	— —	— —
Chestnut	5 00	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A. 6 00@6 25		— —	— —
New England	" —		— —	— —
Locust Mountain	W. A.	6 50	— —	— —
Honey Brook, Le'h	W. A.	5 00@6 00	— —	— —
Sprink Mountain	" "	5 00@6 00	— —	— —
Sugar Creek	" "	5 00@6 00	— —	— —
Sugar Loaf	" "	5 00@6 00	— —	— —
Old Comp'y's	" "	5 00@6 00	— —	— —
Cross Creek	" "	5 00@6 00	— —	— —
Room Run	" "	5 00@6 00	— —	— —
Girardville	" "	—	— —	— —
McMichael	" "	—	— —	— —
Shamokin	" "	5 25	— —	— —
Lykens Valley	" "	5 75	— —	— —
Broad Top	" "	5 25	— —	— —
Hill & Harris	" "	— —	— —	— —
Henry Clay	" "	— —	— —	— —
Powelton	"	5 25	— —	— —

*Dealers in these coals may be found in our advertising columns.

Prices at Baltimore—Dec., 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$5 60@5 85
Pittston and Plymouth, do	— —@5 60
Shamokin Red or White Ash, do	— —@5 40
Lykens Valley Red Ash, do	— —@5 30
Zerba Valley	— —@— —
Trevorton	— —@— —
By retail, all kinds per ton of 2240 lbs.	7 00@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	— —@4 50
Fairmount and Clarksburg gas, f. c. b. at L. Point	6 00@6 50
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein f. o. b. at Phila	$ —
" Lemon " " "	—
Cumberland Vein Coal	—
Consolidation Coal Co.'s on board N. Y.	6 75
Maryland Coal Co. " "	6 75

Prices at Georget'n, D.C., & Alexandria, Va.

Dec, 1871.

George's Creek and Cumberland f. o. b. for shipping	$4 35@4 05

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$5 25@ 5 50
Lykens Valley	6 25@ 6 50
Shamokin Red or White Ash	5 50@ 5 75
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

Dec, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Duty, $1 25, gold. Coarse	Slack.
Block House	$1 75 @-1 75	
Gowrie	1 75 @-1 75	

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 60	@- 80
Little Glace Bay	1 60	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	$7 00 @- —
Fairmount Gas Coal Co. of N. Y.	7 00 @- —
Despard Coal Co	7 00 @- —
Penn	7 00 @- —
Newburg Orrel Gas	— —@- —
West Fairmount Gas Coal	7 00 @- —

AT PHILADELPHIA.

Powelton	$6 75

TO NEW YORK.

Provincial.	
Sidney	$3 25
Lingan	3 25
Cow Bay	3 37½
Port Caledonia	3 37½
Little Glace Bay	3 25

Prices of Foreign Coals.

Dec, 1871.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" Cannel	10 50@12 00
" House	— —@16 00
" Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" Cannel, "	18 00@20 00

Per ton 2,000 lbs. delivered.

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption	$2 10
For reshipment	2 00

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 92
C. R. R., N. J., Phillipsburgh to Elizabethport	1 88
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 15

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 92
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	1 88
Shipping expenses	25
Wharfage	10
Total	$2 15

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Phillipsburgh	$ 92
Morris & Essex R. R. Phillipsburgh to Hoboken	1 88
Shipping expenses	20
Wharfage	15
Total	$2 15

TO SOUTH AMBOY.

L. V. R. R.	92
B. & D. R. R. / Cam. & Am. R. R.	1 81
Shipping Expenses	35
Total	$2 08

PENN HAVEN TO ELIZABETHPORT.

L. V. R. R. Penn Haven to Phillipsburgh	90
C. RR. of N. J. Phillipsburgh to Elizabethport	126
Shipping expenses	25
Wharfage	10
Total	$ 2 51

Freights.—Dec. 1871.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Phila'a.	Anthracite. From East Port, Port Johnston, and Hoboken.	Anthracite. From Newbury...	Anthracite. From Rondout...
Amesbury			$2 50	$1 95		
Bangor	$2 75		2 25	2 00		
Bath	2 75	2 65	2 35	— —		
Boston	2 60	2 60	2 25	2 75	180	1 85
Bridgeport	2 25	2 30		1 10	1 10	1 25
Bristol		2 60		1 50		1 50
Cambridgeport			2 35	3 00		
Derby				1 25		
Dighton	2 30	2 35		— —		
East Cambridge				3 00		
Fall River	2 25	2 30		1 80	1 40	
Hackensack				140		
Hartford	2 75	3 00	2 40	2 00		
Jersey City		2 00		55	70	
Middletown				1 25		
Mystic				1 75		
New Bedford	2 50	2 35	2 00	2 25		
Newburyport	2 75			2 50		
New Haven	2 25	2 30		1 10	1 10	
New London	2 25	2 30	1 95	1 25		
Newport				1 40		
New York	2 00	1 90	1 40	55	70	
Norwalk		2 30		1 10	1 10	
Norwich	2 25	2 30		1 50	1 40	
Pawtucket	2 50	2 50	2 15	1 00		
Portland	2 50	2 60	2 40	1 70		
Portsmouth, N.H	2 75	2 75		2 50		
Providence	2 25	2 30	2 00	1 50	1 50	
Rockport						
Saco	2 75		2 65	— —		
Sag Harbor				1 20		
Salem	2 60	2 65	2 25	3 00		
Stamford				1 10	1 10	
Stonington				1 25	1 20	
Taunton				2 00		
Warren			— —	1 00		
Washington			1 25			
TO RIVER PORTS.						
Albany						
Catskill						
Cocksackie						
Coeyman's						
Cold Spring						
Fishkill						
Haverstraw						
Hudson						
New York						
Nyack						
Poughkeepsie						
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy						
West Point						
Yonkers						

MARKET REVIEW.

FOR THE WEEK ENDING DEC. 9, 1871.

IRON.—The market for Scotch Pig continues moderately active, but prices are a trifle easier. A sale has been made of 900 tons Glengarnock, to arrive per ship Lake Michigan, on private terms, but parcels on the spot meet with very little attention—we quote nominally Eglinton $33.50@$34, Glengarnock $34, and Summerlee $35@36. American remains without animation, and prices are rather irregular—we quote nominally No. 1 $36@$37, and No. 2 $34@35. There has been very little inquiry for either old or new Rails, but prices are unchanged—we quote English $57@$59, gold, and American $70@71, currency, at the works in Pennsylvania. Bar maintains its firm attitude, with more probabilities of a further rise than of a decline—indeed, there were rumors of a further advance abroad, but we could not verify it, £10 5s. being our last quotation. Black Sheets continue very scarce and the tendency is to higher prices—500 bdls. American R. G. sold within our range. Russia Sheet is selling in small lots, as wanted for consumption.

Import of Iron into New York, from Jan. 1 to Nov. 30, 1871—

	Bar.	Pig.	Sheet, &c
From Foreign Ports	tons. 20,016	tons. 71,959	bdls. 299,754
Coastwise	2	407	2,232
Total	tons. 20,018	tons. 78,346	bdls. 301,986
Same time, 1870	16,664	45,839	231,224

LEAD.—Pig is still very quiet, but there seems to be a

firmer feeling; we retain previous quotations, however, say $5.90@$5.95 gold, for ordinary Foreign. Bar 9¼ cents Sheet and Pipe 10¼. and Tin-lined Pipe 15, all 01 per cent. discount to the Trade.

Import of Lead into New York, from Jan. 1 to Nov. 30, 1871—

From Foreign Ports	pigs.483,263
Coastwise Ports	62,295
Total	pigs.545,558
Same time, 1870	479,927

COPPER—Sheathing is firm at 31 cents, Bolts and Braziers' 34, Bronze and Yellow Metal Sheathing 24, and H. M. Bolts 25. cash. The speculative purchases of Ingot continue, and prices are again a little higher; the movement is based upon an unusually light stock, which can receive no accession now from the Lake Superior region for nearly six months, and the recently advanced prices in England will prevent profitable imports thence unless American goes yet considerably higher; the transactions embrace 8@900,000 lb. Lake at 25@25¼ cents, cash—at the close 25½ cents was demanded for all December and January delivery.

SPELTER—The demand for Foreign is light, but holders are firm at 6¼@6¾ cents gold, Domestic 10 cents currency as to brand

Import of Spelter into New York, Jan. 1 to Nov. 30—
1871.....plates.254,836 | 1870.....plates.261,746

STEEL—The tendency of prices is upward, and some of our dealers in foreign, have already advanced their prices ½ a cent, though others will make no change before next year. American is steady at our quotations.

TIN—The market for Pig continues to be kept in an unsettled and feverish condition, consequent upon the steady and rapid advance in the Foreign markets. Cable advices are at hand from London, quoting English £158 and Straits £155, being a further rise of £3 and £2 respectively. From Singapore the telegraphic accounts are that Tin is scarce and in large demand, Malaca quoted $37,50 per picul. Holders, under these advices, are very firm, and generally demand higher prices, but the business is very light, and quotations are in a great measure nominal. We have only to notice the sale of 15 tons English at 37½ cents, but 38 up to 39 is now asked, as the article is said to cost, at the figures now ruling in London, 39 cents laid down here. Straits is held at 39@40 cents, and Banca, 43, all gold. Plates meet with considerable inquiry, as all the indications seem to point to higher prices. Holders views now are generally above those of buyers. The sales are 1000 bxs. Charcoal Tin at $9.25 for I. C.; 3500 do., mostly to arrive, $9,12½@ $9.50, gold; and 650 do. Charcoal Terne, on private terms.

Import of Tin into New York, from Jan. 1 to Nov. 30.—

	1871.	1870.
PIGS	No·105 217	98,422
PLATES	bxs.979,214	844,400

ZINC—Mosselmann Sheet sold to the extent of 100 casks for forward delivery at 8½ cents less 4 per cent. gold, and this is yet nominally the Agents' price, but no more can be bought at present, at this or any other price—we understand that a movement has taken place on the other side, which looks to an advance here. Manganese black oxide 4 cents currency, Manganese gray oxide 5½ cents currency.

METALS.

NEW YORK, Dec. 9, 1871.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Wrought, $8 per ton.

	Store Prices
Pig, Scotch No. 1, ℔ ton	33 50@38 00
Pig, American, No. 1	36 00@37 00
Pig, American, No. 2	34 00@35 00
Pig, American, Forge	33 00@34 00
Bar Refined, English and American	85 00@86 00
Bar Swedes, assorted sizes (gold)	95 00@100 00

	Store Prices, Cash.
Bar, Swedes	107 50@120
Bar, Refined, ord'y sizes	90 00@— —
Bar, Refined, 1¼ to 6 by ¼ @ 5-16 inch	— —@ 95 00
Bar, Refined, 1 & 1½ by ¼ & 5-16	— —@ 97 50
Bar, Refined, 2½ to 3 Round & Square	— —@ 97 50
Scroll	107 50@137 50
Ovals and half-round	107 50@125 00
Band	— —@102 50
Horse Shoe	105 00@115 00
Rods, ⅝ to 3-16 inch	95 00@130 00
Hoop	112 50@160 00
Nail rod	6¾@— —
Sheet, Russia, as to assortment (gold)	17½@ 18
Sheet, Single, D, and T. Common	—5¾@— 6
Sheet, D. an 1 T. Charcoal	—6 @— 6¼
Sheet, Galv'd, Nos. 14 to 26	27½ to 30 ct. dis. 12@14c lb.
" Nos. 27, 28, and 29	27½ to 30 ct. dis. 15@18c lb.
Rails, English (gold), ℔ ton	57 00 @59 00
Rails, American, at Works in Pa	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	— 15	@— 18
English Spring (2d and 1st quality)	— 7	@— 10
English Blister (2d and 1st quality)	— 10	@— 17
English Machinery	— 11	@— 13
English German (2d and 1st quality)	— 10½	@— 12
American Blister "Black Diamond"	— —	@— 12
American, Cast, Tool do.	— 15	@— 16
American, Spring, do.	— 9	@— 11
American Machinery, do.	— 9	@— 10
American German, do.	— 9	@— 11

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 31
Copper Bolts	— @— 34
Copper Braziers, 16oz. and over	— @— 34
Copper Nails	— @— 39
Copper, Old Sheathing, &c. mixed lots	20 @— 21
Copper, Old, for chemical purposes, 14@16 oz	23½@— —
Copper, American Ingot	25½@— 25½
Yellow Metal, New Sheathing & Bronze	— @— 24
Yellow Metal Bolts	25 @— —
Yellow Metal Nails	— @— 24

SPELTER.—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb	6 25 @ 6 75
Plates, Domestic p. lb	— 7 @— 11

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb: Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs	$— — @— —
Spanish (gold)	5 90 @5 95
German, do.	5 90 @5 95
English do.	6 00 @6 37½
Bar (net)	9 25 @ —
Pipe (net)	— — @10 25
Sheet	— — @10 25

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ℔ lb.

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	42½@43
Straits	39 @40
English	38 @39

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$9 00 @9 50	$10 37½@11 00
I. C. Coke	7 75 @8 75	9 25 @10 25
Coke Terne	6 50 @7 62½	7 50 @ 9 25
Charcoal Terne	7 87½@8 50	9 75 @10 25

San Francisco Stock Market.

BY TELEGRAPH.

Our reports of the San Francisco and Mining Stock Boards, were unavoidably crowded out last week owing to the demands on our columns in giving the proceedings of the American Institute of Mining Engineers. The following report from the San Francisco Mining Stock Board "per telegraph" is dated the 5th inst. Compared with the condition of the market a week ago and excepting a slight decline in Savage, the list is decidedly firmer. Crown Point, forming the most prominent feature in the advance list being quoted $27½ stronger than per last report. Raymond and Ely and Eureka G. V., are weaker no sales of either item has occurred during the past week.

Savage	45
Yellow Jacket	57
Kentuck	153
Chollar Potosi	32½
Gould & Curry	114
Belcher	368
Crown Point	361½
Raymond & Ely	..
Imperial	35
Amador	..
Eureka G. V.	..
Meadow Valley	..

Mining Stocks.

Mining Stocks are dull not unusually so, for that would be an exception, whereas the statement is not the exception but the rule, and our phrase which should be stereotyped, viz., the list is nominally unchanged, describes the condition of the market, the transactions of the Board during the six days just past are confined to two transfers of Smith and Parmlee, one of 600 shares on the 3d inst. at 20, and the other of 100 shares on the date following at 16 cents. When we consider that this same item was formerly quoted in the Board at $50 and $60 per share, we are reminded of the expression of what a fall was there my countrymen.

GOLD STOCKS.

	BID.	ASKED
American Flag	—	20
Bates & Baxter	25	—
Benton	—	—
Black Hawk	40	50
Central Gold	3	5
Cons Gregory	—	30
Grass Valley	—	7
Gunnell	8	—
Holman	—	—
La Crosse	—	—
Liberty	—	—
Mariposa prf	—	—
Montana	—	—
Rocky Mount	—	5
Quartz Hill	—	15
Smith & Parmlee	—	20
N. Y. & Eldorado	—	—

The following report of Petroleum Stocks per list submitted by the Mining Stock Board, may all be explained in a few words; list nominally unchanged and no scales.

PETROLEUM STOCKS.

	BID	ASKED
Bennehoff Run	20	—
Bergen Coal and Oil	15	—
Bliven Oil	30	—
Blood Farm	—	10
Breevoort	25	35
Buchanan Farm	35	—
Central	65	—
Clinton	—	—
Home	1 60	—
National	—	—
New York & Allegheny	90	—
Northern Light	35	—
Phillips Pet	—	15
Pithole Creek	—	1 00
Rathbone Oil	20	—
Rynd Farm	30	40
Second National	—	—
Sherman & B	—	—
Tarr Farm	—	—
United Petroleum Farms	37	40
United States	—	60

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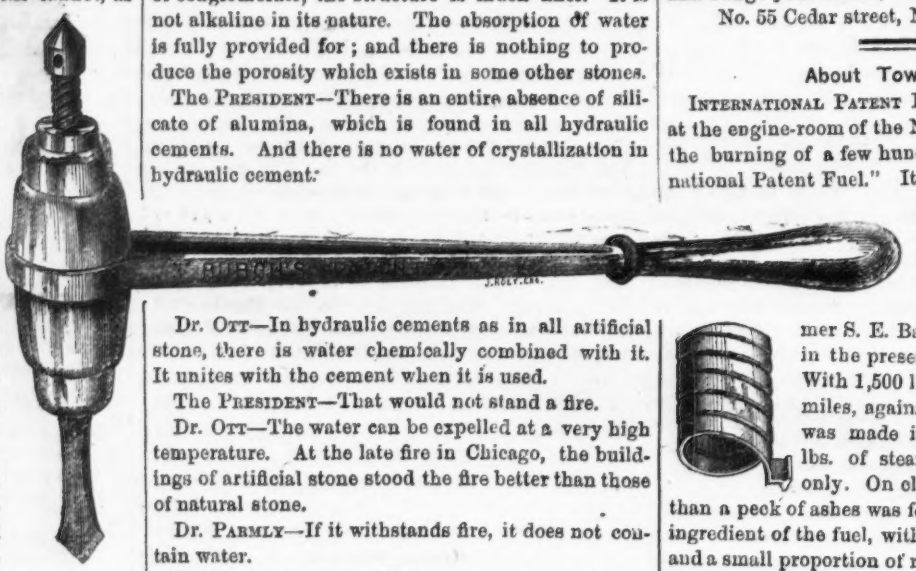
Burch's Helical Hand-Drill.

Two weeks ago we mentioned incidentally the Helical Hand Drill, but this week we are able to lay before our readers an illustration of the same, and we desire to call attention to some of the many advantages claimed for it. It will be seen that pawl and ratchet are both dispensed with, and the power employed is a helical brake, which avoids the back slip of the lever, and gradually brings upon the drill and its shaft the strain of the force applied through the lever to revolve the shaft; it renders the drill less liable to be broken; it saves the wrist and hand of the user from the effect of jars and concussions—due to the sudden stoppage of the lever—such as the bringing up of a pawl against the teeth of a ratchet, when such a lever is used with a pawl and ratchet; it saves the usual noise of the pawl, produced by its slipping over the teeth of the ratchet, which wears away the teeth; it is one of the best hand drills in the market, and it is made with no complication of parts, therefore not being liable to get out of order or break; it can be used at points where ratchet drills cannot, as the set of the brake does not depend upon the swing of the lever to catch upon the teeth. All parts being fully protected if thrown in the dirt or sand, there is no chance of its getting out of order. These and many other advantages will recommend the drill to all engineers and mechanics, as meeting a want long felt for a good reliable hand-drill. It has been tested for the past three years in one of the largest machine shops in the country without any wear on its working parts. The tool is manufactured by the Bridgeport Manufacturing Co., is made first class and fully warranted. It has been just put on the market by Messrs. POST & GODDARD, of 109 Liberty street, who are the sole selling agents, and who will be pleased to answer all inquiries respecting the drill, and send circular when desired. Their advertisement will be found in another column.



Polytechnic Association of the American Institute.

[Meeting held Dec. 1st.]

THE meeting was opened by the reading of a number of brief notes of scientific progress, by the President, upon which a few remarks were made by members.

Then followed the reading of a paper on hydraulic cements, by Dr. ADOLPH OTT, an abstract of which will be found elsewhere.

Dr. OTT exhibited specimens of Frear stone, and of his own artificial stone. The latter costs about half as much as quarried stone, and is relatively still cheaper for ornamental work, being as easily produced of any given form as cast-iron. Frear stone now contains Portland cement.

The PRESIDENT stated that no real hydraulic cement could be formed without magnesia.

Dr. OTT considered magnesia unnecessary, the important elements being silicate of lime and silicate of alumina.

Dr. FEUCHTWANGER said that the Frear stone had not stood the test. Dr. OTT's cement was much better.

The PRESIDENT stated that Frear stone contains shellac, an organic substance, and therefore unlikely to be permanent.

Dr. PARMLY said that unless the shellac were submitted to heat, it would not be in the condition to form cement. Ransom's stone has been found too porous for building stone, absorbing 30 to 35 per cent. of water. Any stone that will absorb 15 per cent. of water, is unfit for building in a climate where a heavy rain is often followed by freezing weather. The pavements around the New York City Hall look well now; but the time to judge of them will be after the disintegration from a Winter's alternate freezing and thawing has had its effect.

Dr. FEUCHTWANGER stated that Ransom's stone had been much improved lately, and did not now absorb moisture. He employs an immense pressure after applying the chloride of calcium, and after that pressure, the stone is steamed.

The PRESIDENT—An artificial stone containing Portland cement, is like the old-fashioned receipt for making stone soup, the virtue not being in the stone, but in the meat that went with it. The virtue is not in the improvements, but in the original hydraulic cement which nature has provided.

Mr. HARNIEPELL considered Dr. OTT's artificial stone an improvement on those heretofore produced, arising from its semicrystalline structure. Slags are produced of great hardness, but they are extremely brittle. But this stone combines the hardness with toughness. Granite is a conglomerate stone, of coarse structure, but a valuable stone for building; but in Dr. OTT's stone, which appears to be a species of conglomerate, the structure is much finer. It is not alkaline in its nature. The absorption of water is fully provided for; and there is nothing to produce the porosity which exists in some other stones.

The PRESIDENT—There is an entire absence of silicate of alumina, which is found in all hydraulic cements. And there is no water of crystallization in hydraulic cement.

Dr. OTT—In hydraulic cements as in all artificial stone, there is water chemically combined with it. It unites with the cement when it is used.

The PRESIDENT—That would not stand a fire.

Dr. OTT—The water can be expelled at a very high temperature. At the late fire in Chicago, the buildings of artificial stone stood the fire better than those of natural stone.

Dr. PARMLY—If it withstands fire, it does not contain water.

Dr. FEUCHTWANGER—Flint and quartz contain the water of crystallization. Opal contains 30 per cent. of water. But the difficulty in my mind with regard to Dr. OTT's stone, is that I do not understand where his crystals came from. The pavement in Central Park, which is of hydraulic cement, and which was laid down a dozen or fifteen years ago, is now as good as ever.

The PRESIDENT—Chemists should understand that what is wanted is not artificial stone, but something to take the place of Rosendale cement, of which 1000 barrels a day are sent to the market. A gentleman has lately bought a little island near Peekskill, on which he found granite equal to that of Massachusetts. It is stated that he gave $10,000, and has refused $100,000 for his bargain.

Dr. PARMLY—That island is but a few feet above the level of the river. It will not be easy to quarry there.

Mr. HEWITT—I was the owner of that island, and sold it for $3000, and I should not like to give the $3000 for it back again.

Dr. OTT—The Rosendale cement is very inferior to the imported cements. It is unfit to be used for pavements. A good cement should be of a light gray color, with a greenish or bluish tinge, but never of a rusty color. But what is the use of searching for deposits of natural cement, when from the elements of lime, silica, and clay, we can not only produce a cement superior to the best natural cement, but by varying the proportions can adapt it to harden in a longer or shorter time as required?

The PRESIDENT—We cannot do it as Nature does it.

Dr. FEUCHTWANGER—It takes Nature many years to make granite, gneiss, or sienite; and how are we to make these chemical combinations in a few hours? We have yet to learn how the combination takes place. We must use a soluble silicate to form an insoluble silicate. If we can do that we can make a good cement or artificial stone. Adjourned.

Since the above was in type, the following letter was received.

TO THE EDITOR—Sir: At the last Polytechnic meeting, some members mistook my meaning, when speaking of silica or oxide of silicon, which the gentlemen thought did not contain water of crystallization. I intended to refer to silicates in hydraulic cement, and some zeolites. I explained, however, that some silicates, or species of silica, like opal, contain a large proportion of water. It is known that opal will lose its rich colors on exposure to the atmosphere for some time, and that they can be restored by putting the stone in a damp place, or immersing it in water or oil. Even the pectolite, which was mentioned by Dr. OTT in his lecture, as being a silicate of alumina, containins soda and water.

Will you please add this note to your reports of the proceedings of the Polytechnic Club of Dec. 1st, and oblige your friend, LEWIS FEUCHTWANGER.

No. 55 Cedar street, NEW YORK, Dec. 5, 1871.

About Town Jottings.

INTERNATIONAL PATENT FUEL.—Monday afternoon, at the engine-room of the N. Y. *Tribune*, we witnessed the burning of a few hundred pounds of the "International Patent Fuel." It made a splendid fire, and generated steam rapidly; but no data were furnished wherewith to make comparisons. On the 8th ult. a trial was made on the steamer S. E. Babcock, on the North River in the presence of eminent engineers. With 1,500 lbs. of the fuel, a run of 13 miles, against head wind and ebb tides, was made in one hour, averaging 68 lbs. of steam, with natural draught only. On cleaning the grates not more than a peck of ashes was found. Peat is the principal ingredient of the fuel, with which hard and soft coal and a small proportion of rosin are mixed, heated by steam, and pressed into cakes of about 12x15 inches.

OPERA GLASSES.—Mr. A. V. Ryder, of No. 6 Barclay street, has just patented a very neat folding arrangement for opera or field glasses, whereby they can be reduced to nearly the space occupied by the lenses alone.

RECENT experiments on steam boilers at Sandy Hook are reported to have shown that, in one instance, steam pressure rose in a boiler from 44 to 100 pounds to the inch in ten minutes. It afterwards rose at the rate of 10 pounds per minute.

Coinage at the Mexican Mints.

Recent statistics forwarded from Mexico by E. L. PLUMB, Esq., to Prof. WM. P. BLAKE, show that the legal exportation of gold and silver from the ports of the Mexican Republic during the fiscal year 1869-1870 amounted to $17,479,014. The coinage during the same period was as follows:

Silver	$19,817,820
Gold	1,182,628
Copper	18,798

being a little over $21,000,000 for the gold and silver.

Railroads in Mexico.

	Kilos.	Metres.
Mexico to Puebla	186	278
Vera Cruz to Paso del Macho	75	
Vera Cruz to Medellin	12	
Vera Cruz to Loma Alta	35	
Mexico to Tacubaya	8	
Mexico to Tlalpam	24	250
Mexico to Guadaloupe	6	700
Total	347	228

or about 215 English miles.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
WILLARD P. WARD, M. E.,
Editors.

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The American Institute of Mining Engineers.

We surrender again, this week, all our available space to the proceedings and papers of the Troy meeting of the American Institute of Mining Engineers. Next week, we shall continue the publication of papers, finishing, we expect, all except three, namely, that of Mr. ROBERTSON, on Blast Furnace Slags, that of Mr. HARDEN on the ores of South mountain and Cumberland valley, and that of Mr. HAHN, on Silver Smelting Processes, these papers being too long for completion in that number.

By order of the Council, the ENGINEERING AND MINING JOURNAL of last week, this week and next week, will be sent to every member and associate of the Institute. Persons desiring to obtain extra copies, to send to friends at home or abroad, can be served at ten cents per copy so long as our supply holds out, and the same may be said of the numbers containing the three long papers above referred to.

We regret that, by a typographical error, the name of Mr. DAVID THOMAS was omitted in our last number, from the report of his paper on the Increase in the Manufacture of Iron. It is some consolation that in the report of the proceedings of the meeting, contained in the same number, full credit was given him.

It is not without pride that we point to the account of the Troy meeting published in this journal, as a faithful reproduction of the proceedings and the spirit of that gathering, and we feel justified in calling attention to the fact, that its preparation has cost the Institute nothing. The expense of furnishing this complete account to all the members and associates is only that of the copies and postage—an insignificant trifle, and a mere fraction of the fees of a professional reporter for the time of the meeting. No pains will be spared, hereafter as heretofore, to maintain the position of THE ENGINEERING AND MINING JOURNAL as the acknowledged organ of the profession.

May we not appeal, on the strength of our history and character, for continued and increased support from civil, mechanical, mining and metallurgical engineers, and from all who are interested in the great industries based upon these professions? The present season is appropriate for such a question; and we take the liberty of pressing it home upon our patrons. Let those who know, and have as heartily declared that they value our paper, do us the favor of making it known to their friends and acquaintances. A most acceptable Christmas token to us will be the renewal of old subscriptions and the addition of new ones.

Mr. Schenck and the Emma.

The Emma mine has been put on the London market at the very high price of £1,000,000, and it is reported that not only half the stock has been sold at this rate, but that it is now in demand at a premium. We do not see in the prospectus of the company any justification for these high figures, except a historical one. The mine appears to be valued at five million dollars, because it has produced some two millions already, and no positive proof is offered as to the amount of ore actually known to be in reserve—at least, none that we have seen. As it is our impression that no single mine in the country is worth five million dollars, we feel, of course, sincere regret that the proprietors of the Emma have obtained so much for that property. The operation is a good one for them; but it will react unfavorably on the whole future condition of the English market; and, taken together with the decline in the shares of other American mines (many of which were sold, like the Emma, on the strength of a brilliant past history,) it will tend to prevent the more moderate, cautious, and numerous investments which this country really needs and can make profitable to the investors.

This being our view of the case, we cannot defend Mr. ROBERT SCHENCK, the United States Minister to England, whose name appears in italics among the directors of the new Emma Company, and also as one of the three trustees for the shareholders, pending the transfer. If there should be hereafter any disappointment among the purchasers of this stock, Mr. SCHENCK will wish he had not lent it his official dignity, as he has done.

Nobody calls the Emma a vulgar swindle. It is well known to have been one of the most profitable mines ever discovered in this or any other country. But the question, whether it is worth five million dollars, is a serious one; and the course of the official representative of the United States, in endorsing a scheme which puts such a value on the mine in its present condition, is doubly blameworthy. It will not help the moral aspect of the matter much, if the mine turns out to be worth all that it is said to be worth; but in the other, not impossible event, Mr. SCHENCK's conscience will be quickened by a decided disgrace.

It is rumored that the promoters of the scheme foresaw the probable condemnation of the ambassador's action, and that he will withdraw his name, now that it has accomplished all that could be desired. The public discussion, it is said, has been just the advertisement needed by the company to distinguish it from numerous other enterprises seeking popular favor. The plan does honor to the shrewdness of the promoters, but not to the judgment of the English public, nor the good taste and delicacy (to use no stronger term) of the American Minister.

The Mining Law.

The Secretary of the Interior makes the following statement in his annual report:—

"The operations under the mining statute of 1866 and subsequent amendments have shown a steady increase in the work of this important branch of the service. Owing, however, in a great measure to the difficulties which are encountered in properly notifying the parties interested in any mine for which an application for patent has been made, the work has been somewhat retarded. I therefore concur in the recommendation of the Commissioner that, in order to properly notify all parties whose interests may be affected by an application for the exact ground sought to be patented, a survey of the claim should be first made, and the required notice be thereafter given for the period prescribed by law, and that at the expiration of said time no further adverse filing be received."

The Commissioner referred to is of the General Land Office; his "recommendation" is exactly what the law already provides; and the difficulties mentioned are new to us, while many evils that do exist and are serious, seem never to have been heard of by the Commissioner and the Secretary."

Blast Furnace Slags*.

THERE is probably less known of this subject than of any other connected with the metallurgy of iron. In all the books that treat of this matter, there are given analyses of slags, their chemical formulæ, the loss of iron, &c.; but few, if any, give the character of the iron made at the time; none give analyses and physical characteristics of the ores and limestones used, and they present merely isolated examples from various furnaces, and consequently one is more frequently puzzled than enlightened after reading them.

During two years I have had occasion to analyse the slags and many of the pig irons from the Boonton furnaces, and for this article I have made analyses of all the different grades of pig made there. A record of these analyses and the deductions drawn therefrom may prove interesting and add a small amount of information on a subject so important to iron men.

A blast furnace is a chemical apparatus, as much as any used in the laboratory; the reactions which take place in it are entirely chemical and governed by chemical laws; the combustion of the fuel, the reduction of the ore, the formation of the slag and the carburation of the iron are simply chemical reactions, which take place in accordance with known principles. The slag is a chemical compound; it is the combination of an acid with various bases, and is as much a salt as the sulphate of alumina and potassa. Its formation is as strictly governed by the laws of chemistry as that of any chemical substance. The silica is the acid and the lime, alumina, magnesia and the alkalies are the bases.

The ores of iron are generally siliceous; if, when an ore is put into a blast furnace and smelted, no base is added, the silica, seeking a base and not finding one, will seize on the oxide of iron, combine with it and carry it off as slag. To prevent this, limestone, being a base, is added.

Now a certain quantity of silica requires a certain amount of lime to saturate it, another quantity of magnesia and another of alumina; all of which quantities will vary with their chemical equivalents. Having, then, analyses of all the material of the charge, the proportions of each may be so calculated as to produce a certain slag.

But with slags, as with other chemical compounds, there may be two atoms of base to one of acid, two of acid to one of base, or one of base to one of acid; and according as this is the case they are called basic, acid or neutral slags.

* By KENNETH ROBERTSON, E. M., CHEMIST TO THE BOONTON IRON WORKS, N. J. A paper read before the American Institute of Mining Engineers.

The acid slags are the most fusible, the neutral next, and the basic the least so. It is obvious that the use of one or the other of these slags involves a question of economy of flux, of the quantity of material to be smelted, and consequently of a saving of fuel. I think it will be admitted, that the slag which is formed at the least expense and at the same time fulfills all the conditions as to fusibility and character of accompanying iron, is the best. To enable us to arrive at a conclusion on this subject, I give a table of analyses of slags from the Boonton furnaces.

The character of the iron is given also; those marked with a star have been analysed and their analyses will be given with those of the other pig irons.

Slags from Boonton Furnace No. 1.

Furnace 45 feet high. Pressure of blast 3½ lbs.

No.	SiO_2	S.	Al_2O_3	FeO.	MnO.	CaO.	MgO.	Fe.
1....	44.87	0.18	9.14	3.42	0.99	23.37	14.13	2.67*a*
2....	45.29	—	—	2.09	—	—	—	1.63*a*
3....	39.48	0.73	8.35	3.01	1.94	29.81	13 31	2.34*a*
4....	36.59	0.48	8.22	2.12	2.04	39.68	9.25	1.65*a*
5....	40.17	0.39	6.59	3.06	3.47	36.10	8.60	2.38
6....	43.22	0.59	9.11	1.29	—	36.08	7.92	1.01*a*
7....	50.10	0.63	8.45	1.08	0.82	27.04	10.40	0.82*b**
8 ...	35.48	0.46	10.26	3.73	2.54	35.79	9.80	2.90*a*
9....	40.51	—	11.59	2.16	—	36.68	—	1.71*a*
10....	39.18	0.55	11.37	1.20	—	28.05	8.78	0.53*a**
11....	41.28	0.45	8.02	2.16	0.92	37.58	9.01	1.73*a*
12....	47.16	0.28	10.41	1.85	0.28	23.30	15.79	1.44*a*
13....	48 04	—	—	1.35	—	—	—	1.05*a*
14....	45.98	0.12	10.17	1.85	—	25.15	15.99	1.44*a*
15....	47.99	—	—	3.69	—	—	—	2.89*a*
16....	47.89	1.05	9.24	2.10	—	22.52	15.63	1 48*a*
17....	45.98	—	—	2.96	—	—	—	2.30*c**
18....	45.40	—	—	3.28	—	—	—	2.55*a**

Slags from Boonton Furnace No. 2.

Furnace 60 feet high Pressure of blast six lbs.

1....	42.17	0.64	13 59	1.23	0.27	33.02	8.31	0.96*b**
2....	44.29	—	—	—	—	—	—	0.82*c**
3....	43.07	—	—	—	—	—	—	1.28*d**

The ores used regularly at the furnaces are magnetites; three of these slags are from a mixture of hematite with magnetite, and will be noticed in their proper places. The magnetic ores are from Morris County, N. J., and have the following characteristics:

The Beach Glen ore is schistose in structure, with much hornblende, mica, free silica, and averages 34 per cent. iron, and 30 to 33 per cent. silica, and is comparatively free from sulphur and phosphorus.

The Millen ore has a columnar structure; the silica exists in an uncombined state, and averages 20 to 22 per cent. It contains about 46 to 48 per cent. iron, and 2 to 3 per cent. phosphoric acid.

The Swede ore contains a great deal of hornblende, no free silica, but little phosphoric acid, and 40 to 45 per cent. iron.

The ores from the Orchard and Mount Pleasant mines are essentially the same in appearance and composition, having a gangue of silicates and free silica. They average 10 to 15 per cent. silica, and 58 to 62 per cent. iron, and do not contain an excessive amount of phosphoric acid.

The Hackettstown limestone is a dolomite containing 6 to 8 per cent. silica.

The calcitic limestone is from Andover, and contains 5 to 7 per cent. silica, about 2 per cent. alumina, and the rest carborate of lime.

A stone from Montville, N. J., is used at times; it is a dolomite with serpentine as a gangue.

One of the first peculiarities we notice in the preceding table, is the utter disproportion between the iron and the silica. We find with a slag containing 50 per cent. silica, a loss of iron of 0.82 per cent, and again with a slag of 35 per cent. silica, a loss of 2.90 per cent. of iron: this shows plainly that it is not for a want of base wherewith to saturate itself, that the silica has carried off iron. Those slags which contain the most iron have been invariably made from a mixture of ores, the greater part of which was an ore containing hornblende and other silicates of iron: in a furnace 45 feet high these do not have time to be reduced, but get into the hearth, are fused, and pass out into the slag. It will be noticed that in the higher furnace the loss of iron is not so great; the same ores are used, but the furnace being higher, the silicates are reduced before reaching the hearth.

The slag which contains 50 per cent. silica and 0.82 per cent. iron was made from iron ore containing between 40 and 50 per cent. silica, entirely in the state of free silica; but there being more than a sufficient quantity of base in the slag to saturate the silica, and it (the silica) being in an uncombined state, saturated itself with lime and other bases, and left the oxide of iron to be reduced.

So we see by these analyses that, between the limits of 50 and 35 per cent. of silica the amount of iron lost is not due to the amount of silica, but rather to the state in which the silica exists in the ore.

This accounts for the loss in part but it will be seen that the greater losses occur in the smaller furnace, where the pressure of blast was 3½ pounds, the "stock" in larger pieces than in No. 2 furnace and the furnace working rapidly and making white iron. It would thus seem to be necessary to submit to a loss of iron in the slag in order to make white pig.

We see also that white iron was made with slags containing as high as 48 per cent. silica with 3½ pounds pressure of blast, and that grey forge was made with a slag containing 42 per cent. silica and 6 pounds pressure of blast. A slag from grey forge iron at Hokendauqua gave 42 per cent. silica and one from Glendon gave 38 per cent. silica.

Two slags in the preceding table (Nos. 3 and 4) show severally 39 and 36 per cent. silica and still the iron was white; this can be readily accounted for when we know that the charge, in one case, consisted of ½ Staten Island hematite and in the other instance ½ the same ore; which ore contained 1.25 per cent. sesqui oxide of chromium, the chromium from which went into the iron making it white and hard. Otherwise, with as basic slags as these were, we would have had every reason to have expected a different iron.

We may then safely say that with a slag containing above 42 per cent. silica and a low pressure of blast we will have a white iron and that with a slag containing less than 42 per cent. we can expect a grey forge or foundry iron according as the slag is more or less siliceous within the limit.

It may be asked whether it is not possible to make a grey forge pig with a slag containing more silica than those quoted. It is a question which can only be answered by experiment; but I think it is likely that the furnace working "hot," and with as great a pressure as 6 pounds, there would be a strong probability of the silica being reduced, and the silicon passing into the pig, making it unfit for mill purposes. The following determinations of silicon in pig iron will serve to confirm my impressions.

I. Si. 0.78 per cent. made with a charge of 7 cwt. ore to 3½ cwt. stone.

II. Si. 2.10 per cent. made with a charge of 7 cwt. ore to 2½ cwt. stone.

III. Si. 0.95 per cent. made with a charge of 7 cwt. ore to 3½ cwt. stone.

The mixture of ores being nearly the same in each case, it will be seen that No. II., containing 2.10 per cent. silicon, was made with a slag more highly siliceous than the others, and also that if we make the charge too siliceous in working for a grey, we are apt to introduce silicon into the pig, the condition of the furnace being favorable for the reduction of the silicic acid; thus, in making grey forge iron, we must necessarily have the slag sufficiently basic to prevent this, which involves, of course, an increase of lime in the charge, and consequently increased cost of the iron. In this, if nothing else, the production of grey iron for rolling mills is attended with greater expense than that of white iron; but when lime is added the amount of material to be melted is increased also, and at the same time the fusibility of the slag is diminished, which evidently causes a greater consumption of coal.

White pig is made with a slag ranging from 40 to 48 per cent. silica, and with a low pressure of blast; this iron contains about 0.40 per cent. silicon. The smallness of this amount can be accounted for by reason of the furnace working rapidly, the blast being at a low pressure, and the charge not being sufficiently long in the furnace to cause the reduction of the silicic acid.

If a good white iron was made with a slag of 48 per cent. silica, it follows that the pig, made from one containing 40 per cent. silica, was made with too great an expenditure of limestone. The method of charging the furnace without any reference to the slag to be produced, is fully illustrated by the following record of charges and analyses:

No. 1.			No. 2.		
CWT. QR.			CWT. QR.		
Charge 6	½	Ore.	Charge 7	0	Ore.
" 3	0	Limestone.	" 2	3	Limestone.
SLAG.	PER CENT.		SLAG.		
$Si O_2$	=	41.28	$Si O_2$	=	47.16
S	=	0.45	S	=	0.28
$Al_2 O_3$	=	8.02	$Al_2 O_3$	=	10.41
Fe O	=	2.16	Fe O	=	1.85
Ca O	=	37.58	Ca O	=	23.30
Mg O	=	9.01	Mg O	=	15.79
			Mn O	=	0.28

The same ores were used in each case, but with No. 2 slag they were far more siliceous than with No. 1, and yet there was a larger proportion of ore and a smaller quantity of limestone used in the second case than in the first, and the limestones used were also poorer than with the slag of 41 per cent. silica.

Now a white iron was made in each case, and as no complaint was made by the mill manager, it is fair to suppose that there was no fault to be found with either one. Consequently it is evident that the iron with the first slag was not made as economical as that with the second.

Unfortunately no analysis of either iron was made, so nothing definite can be known as to their character; but at all events the only important constituent to have been determined would have been the silicon, and as there was no complaint made, it is fair to believe that no injurious amount was present in either iron. In fact, we have never had a complaint on this account from the mill except in two instances. Once with the grey pig made from Hackettstown hematite, which contained by analysis 2.99 per cent. silicon and the second time from pig bought from the Reigelsville furnaces, which contained 3.48 per cent silicon, wasted in the puddling furnaces and made a rotten bar containing 0.43 per cent. silicon. I think, then, that it will be fair to infer that a white iron, made with a slag containing 47 per cent. silica and with 3½ pounds pressure of blast, did not contain any injurious amount of silicon. As for the phosphorus and sulphur in the pig, the amount of silica in the slag would not influence the quantity of those elements present, since the full amount of phosphorus in the ore is bound to go to the pig and little or no sulphur is carried off by the slag.

[TO BE CONTINUED.]

The Advantage and Importance to the Community of the American Institute of Mining Engineers.*

BY MARTIN CORYELL.

Communities and people naturally fall into the opinion that their business and pursuits are different and distinct from those of other sections, not dependent the one upon the other, and that their own particular branch is the most important to themselves and the country. The case in point is particularly illustrated by the great and independent interests of coal and iron production and transportation, which have separated themselves widely and distinctly, and yet one cannot succeed without the other; and whatever benefits one, or injures it, must eventually have a corresponding effect on the other too, and then upon the country at large.

* The letter *a* denotes that the furnace was making white iron, *b* grey-forge, *c* mottled, and *d* grey.

* A paper read before the Troy meeting of the Am. Inst. of M. E.

In my opinion much may be accomplished by bringing together the workers in each branch, and having a free interchange of opinions in reference to the economy and improvements of working, and to material and machinery, considering how uniformity of price, of production and labor, can be more readily maintained, the markets more steadily supplied, and those spasmodic demands for transportation avoided, which require of transportation companies within three months the work which should be distributed throughout the year, putting the rush of work in the most inclement and unprofitable season of the year.

Mining, metallurgy, and transportation, are special branches which are to play a most important part in the future of our country, and our colleges and institutes of learning have realized the necessity of education in these branches, and are putting forth their energies under the most able teachers to prepare the young men with such knowledge as will make them practical and useful in the occupations we have previously named and in allied sciences also.

I cannot mention all the colleges and institutes of learning that contribute so much to the cause, but I must be permitted to name the earliest institution of the kind, one which has given us so many men of mark, and now in the prime of manhood, who with practical experience and industry, based on a thorough education and integrity of character, are directing and disbursing millions of money annually, throughout our land; I allude to the Rensselaer Institute of this city.

Among my own friends and in my own district of the Lehigh River we have Lafayette College of Easton, Pa., most liberally assisted by Mr. PARDEE; the Lehigh University of Bethlehem, Pa., founded, and supported in a great measure, by Judge ASA PACKER; and the Stevens Institute of Hoboken, so liberally provided for by the late EDWIN A. STEVENS.

The catastrophe at Avondale, which occurred just before the organization of our society, in May last, and three most calamitous incidents since our organization, should induce all who are in any way interested in the ownership or workings of anthracite coal to band themselves together for mutual protection, aid and comfort, and the general welfare of the region.

We have been painfully made aware of the gross ignorance under which mining operations have heretofore been pursued in the coal districts; and, in reference to it we have a committee from this society "On the Waste in Coal Mining."

So long as the crop-line of the seams of coal furnished the necessary supply of coal cheaply, the market was supplied without much capital, skill, or loss of life. But now the consumption of coal is so great that larger amounts of capital are needed to penetrate deeper into the earth, and requiring a greater risk of life and limb to supply the demands of commerce and manufactures, and to keep up the progress of the age; therefore, it is incumbent that we should educate ourselves, as a society, to meet these requirements. We should be able to devise, construct, and operate such machinery and instruments, and to make such chemical tests and measurements as will make us "masters of the situation."

The Mine Ventilation Act of the Commonwealth of Pennsylvania, although far from being perfect, is a step in the right direction, in compelling owners and operators of mines to use greater caution in the employment of labor, and in so doing they are obliged to use better and more costly machinery and appliances, by which hoisting and pumping can be effected, ingress and egress from different portions of the mines can be readily and quickly made, workmen can be put into and taken from the mines by the aid of steam, bestowing their muscular powers directly upon their work, and not wasting it in going to, and returning from their place of labor.

Instead of guessing at the quantity and kind of air pervading a mine, and to be inhaled or exploded by the miner, instruments for measuring its quantity, direction and velocity, and the safety lamp, are now used with great success and satisfaction, though we are yet in want of some chemical tests to detect quickly the presence of noxious and inflammable gases, and some material to neutralize in the mines, or in the systems of the miners, these deleterious gases or compounds.

More security to the miners from "falls" of rock and coal must be given in the future than has been given in the past, by working under shields or by methods that are positively secure, A member of our Society at the last meeting meets this question by his essay and plans entitled "The use and advantages of the Prop Screw Jack."

With all the cost and expenditure that has to be made to secure the workmen in the mines, if there is not a greater economy exercised in the mining and production of the coal to overbalance the account, there will cease to be a profit in this branch of business; and the laws of trade are so inexorable, that if an overplus or profit is not returned, the business will cease.

With some modification these remarks apply to the iron trade, in the mining of the ores, and the production of the metal, and its transportation to market, and so to all metallurgical operations, and to manufacturing.

The immense expenditure of capital and labor in opening mines, constructing machinery, furnaces, mills, railways and hydraulic works, requires great and varied information; and it is only by systems of figures and accounts, mechanical construction, chemical analyses and combinations, mineralogy and geology combined with practical experience, and results that can be recorded and compared, that a commercial value can be given to these undertakings.

Does not this society tend largely to promote these objects, and does it not produce a feeling of interest and show the dependence of one industry upon another, and create a sociability between far off communities that is pleasing and instructive; and have not our efforts thus far been crowned with such pleasure and success that all who have participated in them look forward to our future meetings for renewed enjoyment?

Professor Hayden's Report.*

THIS is by far the most satisfactory volume which has yet appeared as the result of Dr. HAYDEN'S prolonged explorations. It contains, besides the general report of the chief geologist, many interesting contributions from his co-laborers. Prof. CYRUS THOMAS furnishes accounts of the agricultural resources of Wyoming, Colorado, New Mexico and Utah, and a descriptive list of new species of orthoptera, with remarks on the *Caloptenus Spretus* or "hateful grasshopper." It is worthy of note that whereas he formerly believed (with the late Mr. WALSH) that the vast migratory swarms of this insect issued from the mountain cañons, he is now induced by the evidence of Mr. BYER, Dr. MCDONALD and others, and by his own later observations, to believe that the elevated barren table-lands of Utah and other parts of the interior, "composed of coarse sand and gravel, and but slightly covered with vegetation, are the principal hatching grounds of the migratory swarms," while there are all over the Rocky Mountain region, in valleys and plains, and up the mountain cañons almost to the snow limits, local broods, appearing to have little or no connection with the others.

Professor MEEK'S preliminary palaeontological report is interesting mainly to specialists, and the same may be said of the contributions of Dr. LEIDY, on the vertebrate tertiary fossils, Mr. LESQUEREUX on the cretaceous and tertiary fossil plants of Kansas and Nebraska, and Professor COPE on the fossil reptiles and fishes, though these gentlemen have occasionally indulged in generalizations which will attract even the unlearned reader. Mr. LESQUEREUX'S chapter on the fossilization of plants is particularly worthy of mention for clearness and compactness though not for novelty.

Professor J. T. HODGE writes on "the Tertiary coals of the West"—an unfortunate title, since the determinations of MEEK and the reluctant admissions of HAYDEN, both contained in this volume, indicate that these coals are largely Cretaceous. As we formerly put some faith in Dr. HAYDEN'S positive assertion that there was no workable coal older than the Tertiary, west of the Mississippi, we must confess that the overwhelming refutation of his views which a brief period has effected, shakes our confidence in his judgment altogether. A distinct retractation would become him better than the cool way in which he now avoids allusion to his former dogmatisms, while he is forced to admit the truth. Moreover, it is unkind of him to let Mr. HODGE prattle of Tertiary coals, on the strength of HAYDEN'S old reports, when the latter now knows better. Mr. PERSIFOR FRAZER, by the way, also contributes a chapter on Rocky Mountain coals, containing a number of analyses.

Mr. FRAZER inclines to class the coals as bituminous, adopting a classification of ROGERS which does not include lignites. We cannot agree with this view, which is contradicted by the behavior of the coal under coking or combustion. The chemical constitution, to which Mr. FRAZER alludes, is no more like that of bituminous coals than like that of lignites; and the amount of water directly indicates lignites.

Professor NEWBERRY'S article on The Ancient Lakes of North America is a model in its way. It offers in a comprehensive, intelligible and attractive form the results of patient labor upon technical details, generalized by a master. We wish our scientific oracles would oftener translate their learning in this style for the uses of their fellow-men—especially when their works are printed as public documents for information of the people at large. The trouble is, that few of them can at once investigate profoundly, generalize surely and then express themselves clearly. Certainly NEWBERRY is of that few. His report on the Cretaceous and Tertiary plants of RAYNOLDS' Yellowstone Expedition contains a similar specimen of his skill, namely, a description of the physical geography of the continent during those periods, which, taken together with this paper on the Ancient Lakes, is better calculated to give the average reader a vivid and correct notion of the physical changes of our vast interior than any other treatise within our knowledge. Prof. NEWBERRY'S English is generally excellent, though now and then a little careless. So, for instance, he remarks (p. 331) that "east of the California Valley the Sierra Nevada lies, *like a* lofty mountain chain" etc. Very like indeed, we should say!

We must more seriously question the accuracy of the statement (p. 334) that the dimensions of the interior lakes are *steadily diminishing from year to year.* There is no proof that they are now diminishing at all; certainly they are not diminishing steadily from year to year. Salt Lake steadily rose for many years, and only within the last two seasons has stood still or receded. The fact seems to be that those lakes which now remain maintain a fluctuating equilibrium between rainfall or snowfall and evaporation—though with regard to their past history, and that of many others now entirely drained or dried, Professor NEWBERRY is, of course, entirely right.

This volume concludes with half a dozen catalogues of zoological and botanical specimens, prepared by as many well-known naturalists, a table of meteorological observations, and an alphabetical index, from which, unfortunately, the names of the numerous authors are omitted.

*PRELIMINARY REPORT OF THE UNITED STATES GEOLOGICAL SURVEY OF WYOMING, *and Portions of Contiguous Territories, conducted under the Authority of the Secretary of the Interior,* By F. V. HAYDEN, *United States Geologist.* Washington, Government Printing Office, 1871. 8 vo., 511 pp.

MINING SUMMARY.

California.

INYO COUNTY.

The *Scientific Press* of Nov. 5, has the following extract from a late issue of the Inyo *Independent* relating to the series of mines, known collectively as the Silver Sprout:

The series comprises some thirty different ledges, together forming a complete labyrinth or net work of quartz veins, such as is seldom met with—perhaps nowhere else in the State. Some 20 shafts and tunnels have been opened on this property, within an area of 500 by 2,000 feet, and from the developments already made, the evidence is very conclusive that the property must be a very valuable and extensive one. Within the area above mentioned there are not less than 30 different ledges together forming a most perfect labyrinth or net work of quartz veins. The two principal ones, called the "Lamb" and "Silver Sprout" are about 300 feet apart, parallel to each other, and to the crest of the mountain. They cut through and across three ridges which extend down the side of the mountain. This gives the best possible position for prospecting at varying heights. Both of these ledges have been opened at various places, from 50 to 300 feet apart, covering in all some 1,500 feet. Several of the minor ledges have been prospected, each presenting the same general characteristics of the main, or Silver Sprout.

In order to determine the future course in regard the management of the mine, Mr. WINGARD has selected for shipment and reduction in San Francisco, about 3,000 pounds of fair, average ore, a portion from the several different openings of the mine. The location considered in relation to to the facilities for getting out and reducing the ore may be considered as good as could be desired. The attitude is very great, probably not less than 10,000 feet above the sea. It is about three miles distant from, but fully 3,000 feet higher, than the famous Kearsage mine, and on the same mountain. It is, however, an entirely distant series of mines, though there is a great similarity in the nature and appearance of the ores of the two mines. Both carry a small percentage of base metals, but scarcely enough to be considered "rebellious." The mine is situated upon the Southern face of the mountain in such a manner that the snows or storms cannot materially affect the transportation of the ore by tramway, which is the only cheap method practicable.

The mill now owned by the company is down the canon nearly 5 miles. The proper place for the mill and to which it will soon be removed is immediately below the mine and about one mile distant. Here, there is an abundance of timber and water, a wide valley free from all dangers of snow-slides, and where, by means of a tramway, ore can at all seasons of the year be shipped directly from the mine to the batteries. The whole cost of mining, transportation, and reduction of the ore from the mine, with the proper and practicable facilities, need not exceed $10 per ton. The Silver Sprout is unquestionably a very valuable mine, and with proper management cannot fail to remunerate its owners and at the same time prove of great benefit to this section generally.

Colorado.

From the *Miner* of Nov. 23:

DAILY & NOTT has shipped since our last issue, for and on account of owners, 13 tons of first class smelting ore.

ALBERT JOHNSON, Superintendent of the Roe Silver Mining Company, informs us that that the John J. Roe lode is looking remarkably well.

P. H. HUGHES & Co., have leased the Cherokee lode, and are taking out first rate milling ore. Ore treated in the mills taken from the Cherokee yields first class 430 ozs. per ton, second class 222 ozs. per ton.

CHARLES S. HILL and PARK DISBROW have made lately an important discovery on Columbian mountain, Montana district. The ore assays 213 ozs. The crevice is reported large and well filled with good pay material.

CHARLES R. FISH furnishes us with the certificate of PALMER & NICHOLS, which certifies that first-class O. K. ore treated by them yielded at the rate of 911 ozs. per. ton, and second class ore from the same mine yielded at the rate of 361 ozs. per ton. Georgetown is a good place to fish up rich items.

The last mill run of Magnet ore, from the whole crevice, gave a yield of 235 ozs. per ton. This is a new feature in our mining affairs, and we hope that we will believed in the future, of the necessity of reporting the first and second class ore taken from our mines. Three levels are being worked, and rich milling ore is in sight in every one of them.

The Stewart Silver Reducing Co. have shipped since our last issue,

Brick No.	Oz. Silver.	Fine.	Coin Val.
379	780	724	$ 730 16
380	1081	792	1106.94
381	1148	784	1163.72
382	760	752	738.94
383	909	716	811.49
Also Lead Bars,			
81	1042	360	4850.5
82	1231	414	706.72
			$5772. 99

The mill is running mainly on second class Terrible ore, and small lots of ore from various lodes.

The International Mill, Argentine, has shipped

Bar No.	Ozs. Silver.	Fine.	Coin Val.
29	1105	753	$1086 60

PALMER & NICHOLS have shipped

Bar No.	Oz Silver.	Fine.	Coin Val.
416	1373 50	741	$1342.27
417	1251.40	732	1213.80
			$2556.07

Bar 417 was we understand manufactured for private parties.

Total for the week, $9410.66.

BOWMAN & Co. have twenty-five tons of Prince Albert ore at the mill of the Stewart Silver Reducing Company for treatment. This ore has been lying on the dump since 1866-67. There are many other dump piles in this section of the country that would pay good profits if they were hauled to the mills and treated.

The *Inventors' Guardian*, of October 28th, a stately English mining journal, published in London, quotes the stock of the Silverplume Mining Company at 2½ to 3 per cent. premium. We can state, for the satisfaction and information of the English stockholders, that the Silverplume Mine is, at the present writing, yielding rich ore, in large quantities.

We understand that J. P. AREY, the inventor of the Arcy Furnace, has purchased the Killwinning lode, Sherman Mountain. JAMES SHERARD, one of the workmen on the mine, has laid on our table specimen samples of the ore now being mined out that are rich in silver. We mention this fact to show that our own citizens have confidence in our mines.

JOHN NOLAN, a gentleman who has been engaged in placer mining for many years in Gold Run, Summit county, called on us this week, and gave us many interesting particulars in regard to mining affairs in our sister county, on the other side of the range. Mr. NOLAN informs us that preparations during the past summer have been made for placer mining on a large scale, during the summer of 1872. One company, he says, will work 200 men as soon as the season fairly opens. A few men are still sluicing on the Blue, above Breckenridge. PAT CASSIDY and others are constructing a ditch below Ten Mile, to obtain water to work their ground at Salt Lick Gulch. Mr. NOLAN visited, a short time before leaving the county, the already celebrated King lode, discovered late this fall in Pollok district, near the head of the Blue. He confirms all previous reports concerning the richness of this new discovery. It bids fair to outrival any gold lode ever discovered in Colorado. A great many specimens of wire gold, and rock glittering with the yellow metal, have already been taken out. The lode outcrops in such a manner that levels can be driven in on the vein, and great depth gained from the surface. The owner has ample store of provisions, and will work his property during the winter. Mr. NOLAN thinks that the gold product of Summit county for the year 1872 will be very large.

We visited Empire last week, and have gathered a few items in relation to matters there of more than transient interest to the mining community. We have on several occasions called attention to a series of tests that were being made at the Peck Mill by Messrs. F. W. CROSBY and L. P. COOK on the ores of that district. The object in view has been two-fold. First, to determine whether the Crosby Furnace and Process were adapted to these ores; second, whether the ores were rich enough to pay. We are and always have been a believer in there being a "good time coming" for Empire, knowing as we do, that for length, bredth, depth and richness, her mineral veins can scarcely be surpassed; so we are glad, but not surprised to learn that these gentlemen have been decidely successful in their experiments. Seven tons from the refuse of the Conqueror dump, treated by the Crosby method gave a return of ten dollars and fifty cents per ton. The same worked raw never yielded more than five dollars, and seldom more than three. A sample from the Gold Dirt lode panned out at the rate of seventy-five dollars per ton—fully twice what could be obtained without roasting. These tests were carefully made, and on so large a scale as to have a value, far greater then those made in a laboratory. The method of treatment is simplicity itself, and the district has abundance of ore that will pay. The Gold Dirt lode alone could supply 100 stamps for years to come. It is from ten to twenty feet between walls, and carries near the surface, an average of two feet of rich mineral. Comparatively little work has been done on it, but enough to prove it one of the best in the district; and yet it is but one of many. We expect ere long to have the pleasure of adding to the list of our bullion shipments a large and regular contribution from Empire.

From the Caribou *Post* of Nov. 25.

DEPOSITS OF SILVER AND GOLD ORES ON MOUNTS LINCOLN AND BROSS, AT THE HEAD WATERS OF THE PLATTE.

WILLIAM BEMROSE, from South Park silver district, gives us some interesting particulars respecting the recent wonderful mineral discoveries of that section. The Montgomery branch of the Platte River takes its rise about the base of Mounts Lincoln and Bross, over which country the limestone formation extends, and these mines, or deposits, are found first near the base, and continue to within two or three hundred feet of the summit of Mount Lincoln. The Moose Lode, the most developed of any, is not more than a thousand feet below the summit of Mount Bross, and must be at an elevation of at least thirteen thousand feet above the sea. These mountains seem to form the culmination of the range where the upheaval is the broadest and highest, where the great rivers, the Platte and the Arkansas, and the Rio Grande, and others which flow westward take their rise. The discovery and development of these mines commenced so late in the season that as yet little can be determined in regard to the extent of the silver district, but it is supposed to be co-extensive with the limestone formation, of which, in the absence of an accurate data, we can only say the territory already explored is but a small portion of the whole. The Moose Lode, on Mount Bross is the most developed, being stripped on the surface for four hundred feet, disclosing a crevice varying from twelve to eighteen inches in width, and of nearly uniform value. Before the cold weather set in forty tons of this ore was raised and sent down the mountain, a part of which was sent to Newark, New Jersey, and netted $300 per ton. A parcel from the Dwight Lode, another deposit belonging to the Moose Company, returned $280 per ton at Professor Hill's. On account of the great elevation it is comfortable for working the mines without sheltering only about one-half the year. But with shaft-houses and reasonable winter preparations, there need be no cessation of mining or reducing. The advantages of the district are an abundance of wood, coal, water, hay and hardy grains and vegetables. Hay is delivered near the mines at from $20 to $25 per ton, and could be contracted for $15, less than half the Central price. The South Park is an extensive and natural hay country. Vegetables are cheap, brought in from the lower part of the Park. The coal mines on GEO. LICNER'S ranch, ten miles easterly from Fairplay, are spoken of as excellent in quality and especially valuable to coke. Quartzville, one mile southwest from Montgomery, at the base of the range, is to be the uppermost Silver City, the supply point to the mines, from which a wagon road will extend to the workings. The place selected for the reduction works is at the junction of the quartz gulch and the Platte River, where another town is probable. While here we have not more than six inches of snow, and only about two inches at Caribou and Ward, there is a foot or more at Montgomery, and eighteen inches at Breckinridge. But this may be exceptional. Usually towns in that section, close up under the range, are accessible at all seasons of the year. The Moose Company will prosecute their work through the winter. They have commenced to tunnel the mountain about eight hundred feet below the lode, and anticipate no inconvenience from wintry weather. Indeed the difficulties of mining in the high altitudes are not as great as popularly supposed. The Caribou Mine, near the timber line, is worked in the coldest weather without inconvenience. It is a common remark among miners that they prefer the cooler and more even temperature of the high mountains to the sometimes hot and sometimes cold climate of the valleys. Our informant is one of the owners of

the North Star Lode, on the North Star Mountain, opposite Mount Lincoln, at an elevation of about $13,000 feet, the highest gold mine of which we have any knowledge. In 1862, from August to October it yielded between $25,000 and $30,000. This was a deposit of gold in the sandstone which underlies the limestone, and overlies the granite formation. Other gold deposits, though perhaps not so large, have been discovered this fall, which will be made available another season. We may expect to see a great rush to these mines at the opening of the next prospecting season. Of all the remarkable discoveries of the ores of the precious metals in various sections now attracting the attention of the whole country, these, unless we except the Grand Island District, in our own Territory, are incomparably the richest, and in all probability will prove the most extensive, and certainly the most easily mined. Neither the Salt Lake nor the Lake Superior mines show anything like such average richness as these wonderful deposits.

Montana.

From the Deer Lodge City *Independent* of Nov. 18:

PHILIPSBURG.

Mr. JAMES H. BROWN has leased the Comanche mine at Philipsburg, and has men employed taking out ore. It is expected to raise several hundred tons from this mine during the winter. We learn that Mr. BROWN will start up the mill as soon as it is placed in good order, which will be at no distant day. About 70 men are now in Philipsburg, all of whom are employed—most of them in taking out quartz. The population is increasing daily. There is reason to believe that from the present time forward it will be a thriving camp, as all seem anxious to push forward work on their mines. CAPT. PLAISTED is engaged in attaching a prospecting pan and stamp to the Stuart Mill. This will enable parties to have their ores fairly tested at small expense. COL. LYON'S will shortly start up a furnace and smelt ores from the Trout mine. FRANK MADISON is taking ore of good quality from the Van Timmen mine.

British America.

A NEW GOLD FIELD.

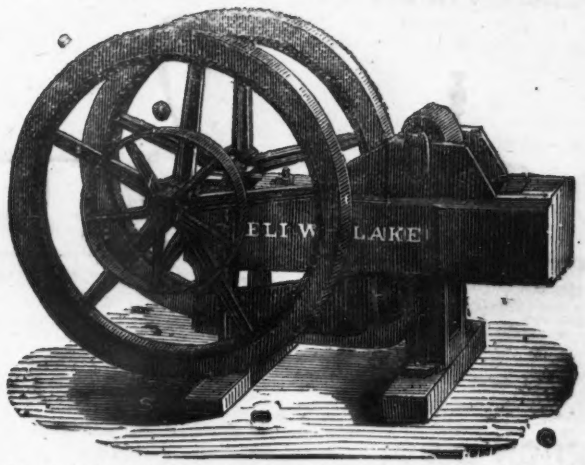
From the St. Paul *Press*, Oct. 16.

Mr. LINDSAY D. SIMMS, of Fort Garry, reached St. Paul last evening from Manitoba, and he brings the interesting information that intense excitement revailed at Winnipeg over recent gold discoveries at Lake Shabondawan. Many specimens of gold dust, nuggets and gold-bearing quartz, had been brought to Fort Garry, and so confident were the people in general that a new Eldorado of unsurpassed richness had been discovered, that hundreds at once repaired to the scene of the discoveries, and the latest information from that region has not only confirmed the previous reports but even exaggerated them to the extent of placing them among the richest mineral deposits in the world, outranking even California or Australia.

The Government of the Dominion of Canada is engaged in establishing a road through the country between Fort William, on Thunder Bay, and the settlements on the Red River Valley, but all work on this thoroughfare has been entirely suspended, the workmen, to the number of several hundreds, having dropped their shovels, picks and axes, and emigrated in a body to the gold fields, where they were each washing out with their hands four dollars a day and upward. News of their remarkable success in finding gold in paying quantities had infected the sober citizens of Winnipeg, and the prospects seemed to be that even the fear of a Fenian raid from Pembina would be forgotten in the general desire to revel among the golden sands of the Shabondawan. There would seem to be some foundation for these reports, for the locality mentioned is in the midst of one of the richest argentiferous regions on the continent. The early explorers of a route through the British Possessions discovered gold and silver in this vicinity, and later investigations have shown that vast deposits of mineral are to be found along the shores of the great lake. Lake Shabondawan lies about forty miles due west from Fort William and at least four hundred miles from Fort Garry. This Lake is only about ten miles in length and but two or three in width, and forms one of the many small bodies of water in that section. It is bounded on the south and west by a mountainous and unbroken country, through which flow several small and rapid streams. Lake Shabondawan is but a short distance from Silver Islet, in Lake Superior, said to be the richest silver mine in the world, and not over one hundred and fifty miles distant from the copper mines of Ontonagon. There is, therefore, reasonable ground for believing that these discoveries may prove to be as valuable as reported; and that the extensive prospecting of experienced gold hunters which is sure to follow, may yet develop mineral resources north of Lake Superior as vast as those which have attracted hundreds of thousands of people to the western slopes of America and the Island of the Pacific.

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



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☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

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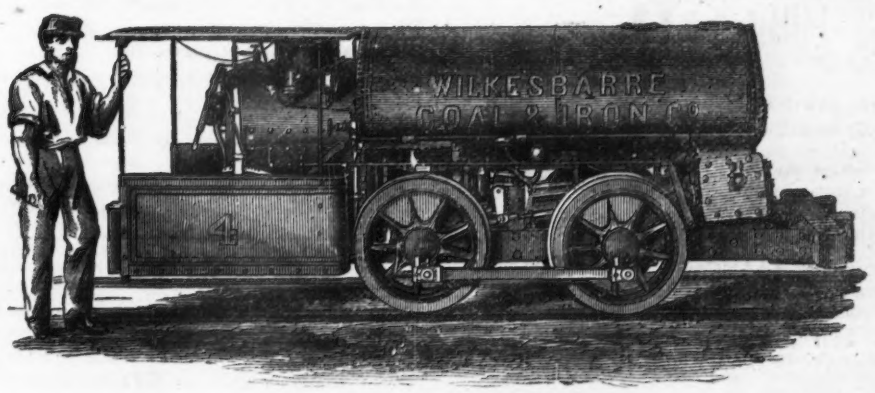

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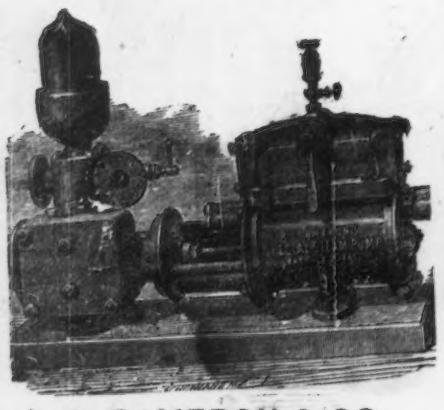

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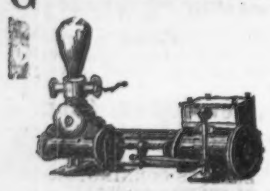

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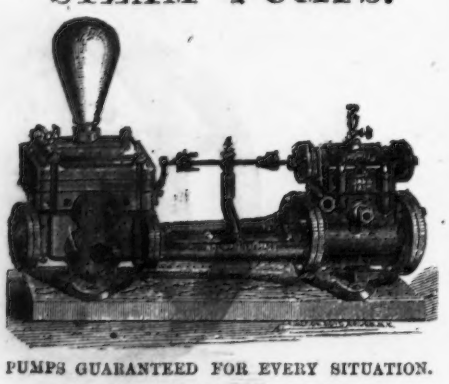

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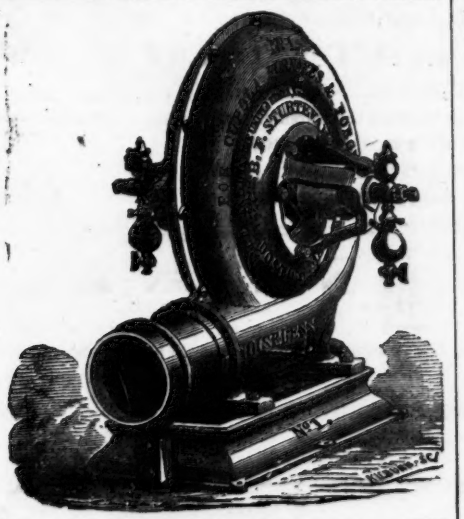

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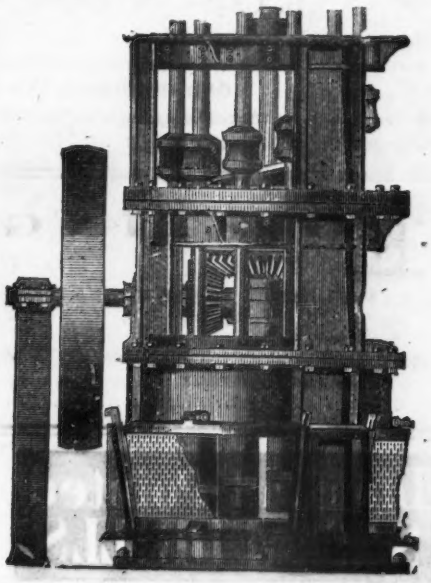

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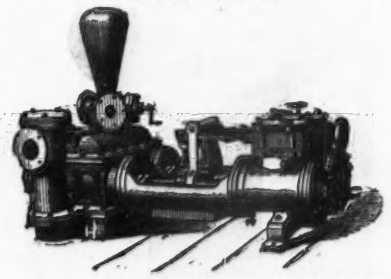

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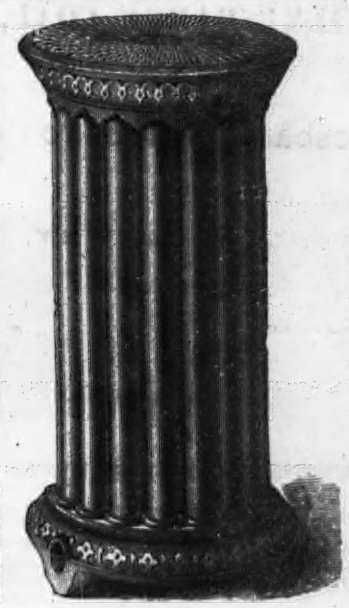

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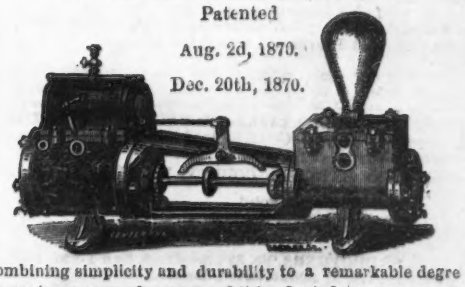

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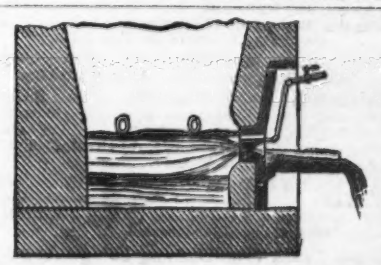

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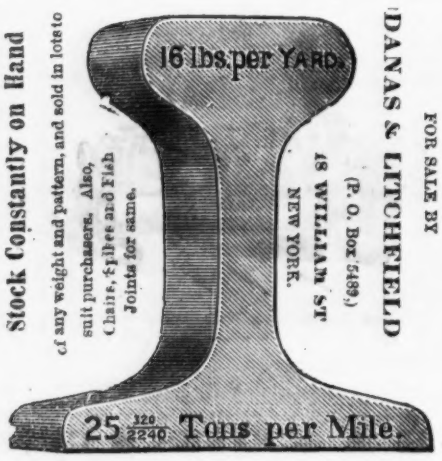
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